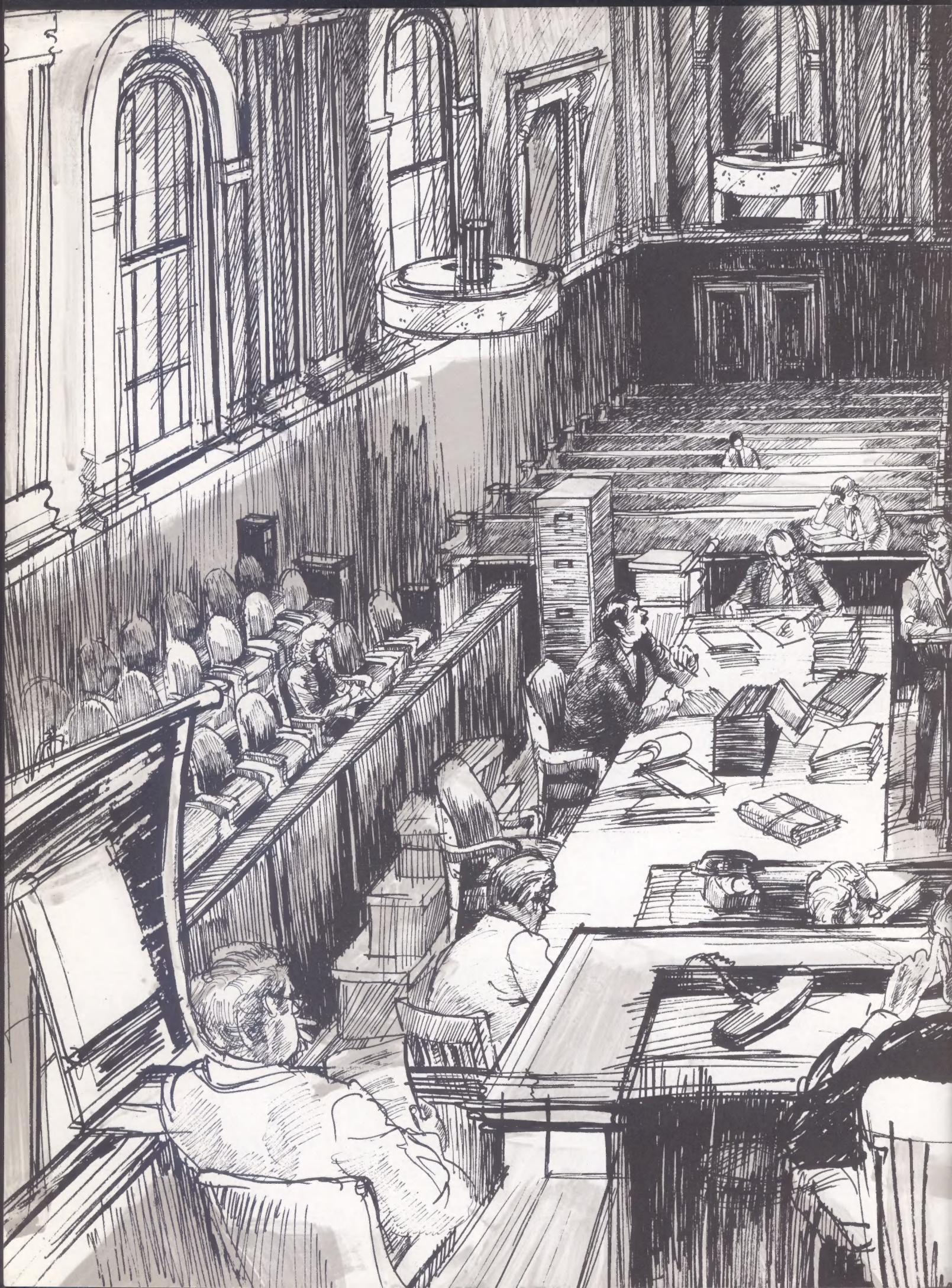
Think

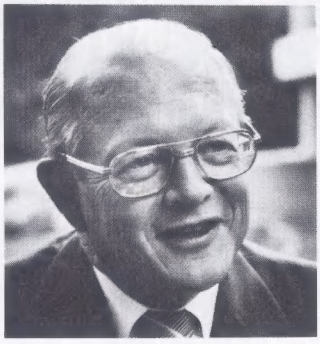
November/December 1977

UP THE DOWN STAIRCASE

How the company is bucking stormy economic weather around the world.



3,272. Come New Year's Day, that's how many days it will have been since the Justice Department filed its antitrust suit against IBM—only 17 short of nine long years. Meanwhile, 30 months will have passed since the start of the trial, and the Government has not yet rested its case. The arena for what some have called "the antitrust trial of the century" is this file-cluttered Federal courtroom on New York's Foley Square. IBM's lawyers sit to the right, the Government's to the left. Since the case is being heard by a judge, a lone reporter occupies the jury box. In the seats beyond, a scattering of the curious and the courtroom regulars who drift in and out. Story on page 32. Drawing by Marilyn Church.



Letter from the Chairman

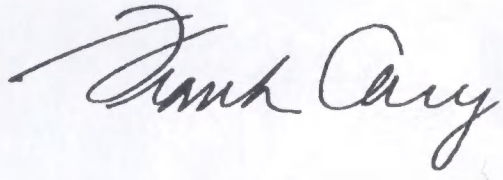
Quite a year. With another exciting one coming up

The holiday season is a special time of the year—time to reflect, to look ahead, to enjoy our families, relatives, and friends.

For IBM, 1977 has certainly been a year of progress. We've added thousands of new people, achieved unprecedented business records, dedicated new facilities, and introduced new products at an impressive rate. Of course, we faced many challenges as well, but I think we met most of them successfully.

I'm very proud of what you have accomplished, and I believe we can all look forward to an equally exciting 1978.

Anne and I wish each of you and your families joyful holidays and personal fulfillment in the New Year.



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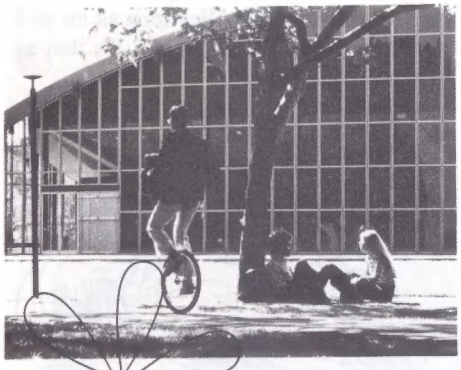

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Bucking the downturn

It's been heavy weather in the economies of most nations around the world. But you'd never know it from the way the company's business is going.

by Geoffrey D. Austrian

If you've seen the cartoon drawing once, you've seen it a hundred times. The rowboat is low in the water. Waves are breaking over the bow. And, despite the valiant efforts of the oarsmen (inevitably world statesmen) to bail, the craft is about to take the final plunge. A sign on the bow labels the vessel *World Economy*.

Although such gloomy prognostications often prove exaggerated, bankers and financial leaders from 131 nations attending the joint meeting of the World Bank and the International Monetary Fund in Washington in early October were only slightly more sanguine in describing the economic outlook for their own countries. Talk, in anterooms and chambers, ranged across varying degrees of pessimism—from a tailing off of growth, to stagnation, to world economic recession. And headlines in U.S. publications generally echoed the mood. "Harder Times Abroad—A Threat to U.S.?," *U.S. News & World Report* asked. "U.S. Firms Dissatisfied with Earnings Abroad as Economies Sputter," *The Wall Street Journal* worried.

In Armonk, where IBM's corporate economics staff exercises its computer models with the latest statistics, as well as using "on-the-ground" assessments by IBM economists in 20 countries, the picture through the middle of 1977 had also been one of lagging growth or sideways movement in many economies. But, during the final quarter, IBM economists saw signs of renewed economic activity in many of the major countries where the company does business.

"Economic growth will be at a moderate rate in 1978," comments IBM Vice President and Chief Economist Dr. David L. Grove. "Most countries will continue to face the same dilemma—balancing monetary and fiscal actions to stimulate growth sufficiently to cut into unemployment and yet keep inflation at manageable levels."

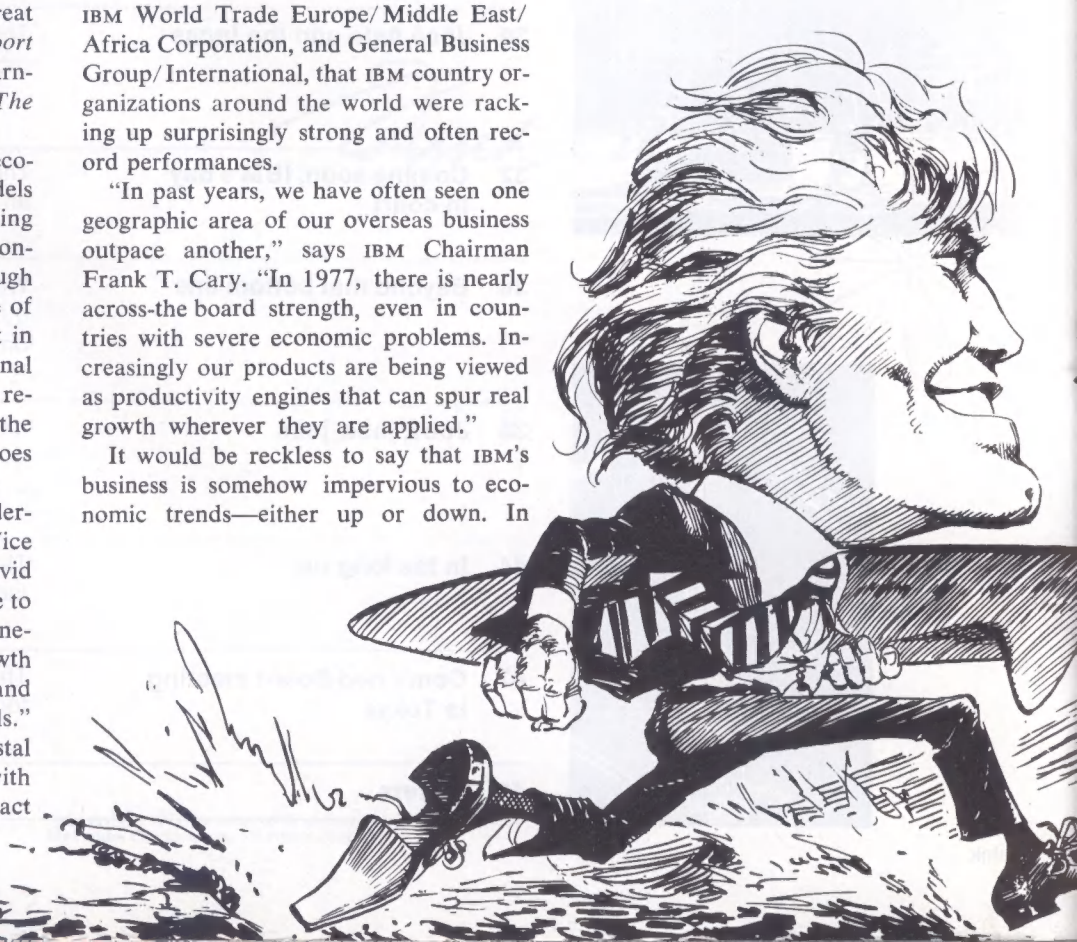
No matter how clear or murky crystal balls turned out to be—and even with computers, economics remains an inexact science—one thing was clear: Recovery from the 1974-1975 recession has not been sufficiently strong to get the world's economies running at anything close to capacity. Unemployment in most countries remained discouragingly high—some 6 million were out of work in the nine European Economic Community countries alone. Inflation, traditionally associated with rapid growth, now often accompanied no growth at all. And the high cost of oil was a hidden drag on many economies.

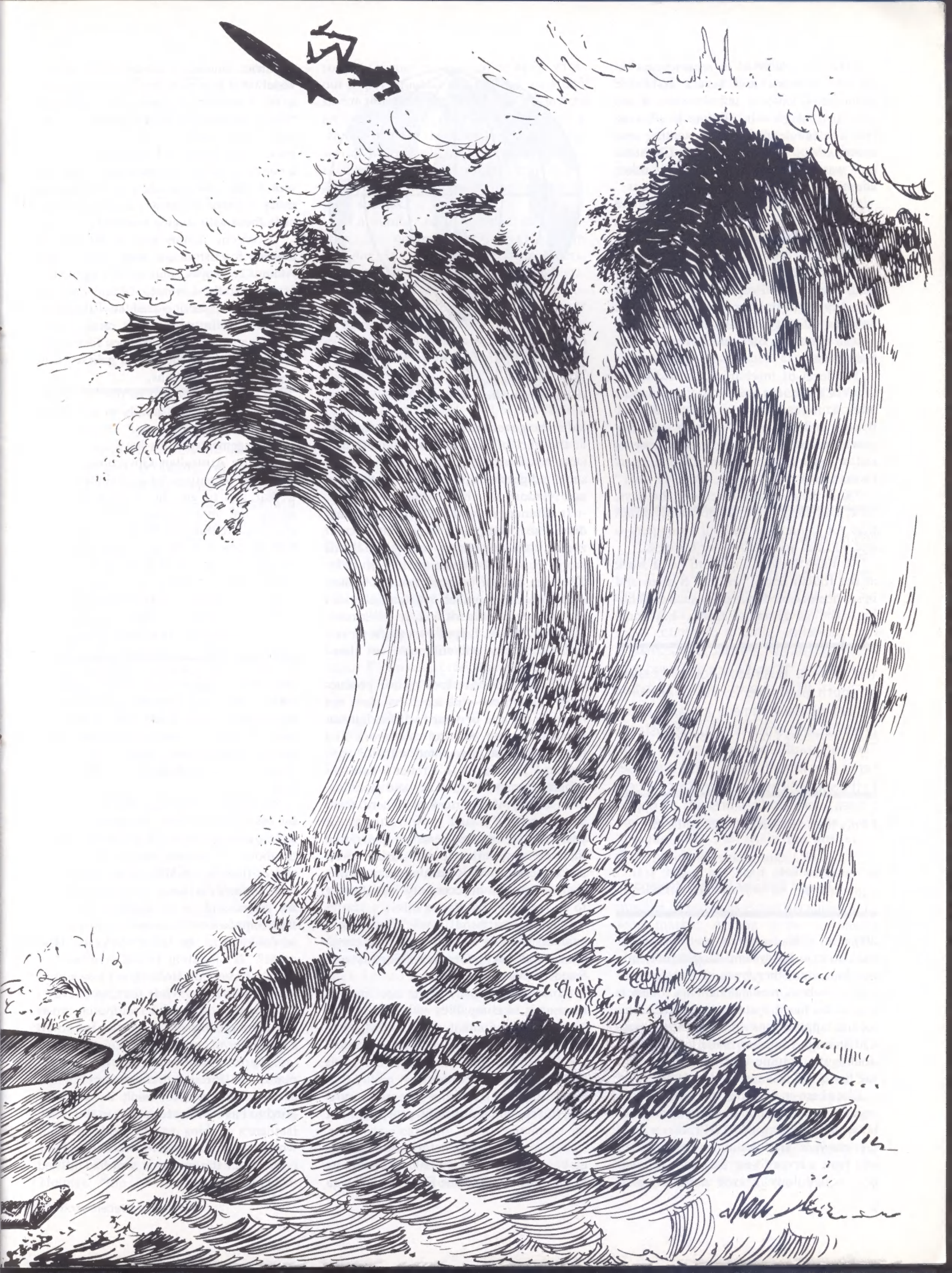
In the face of all this, how has IBM's overseas business, which has accounted for approximately half the company's revenues for the past few years, fared during 1977? Although figures were incomplete as of this writing, it was evident from interviews with executives in IBM World Trade Americas/Far East Corporation, IBM World Trade Europe/Middle East/Africa Corporation, and General Business Group/International, that IBM country organizations around the world were racking up surprisingly strong and often record performances.

"In past years, we have often seen one geographic area of our overseas business outpace another," says IBM Chairman Frank T. Cary. "In 1977, there is nearly across-the board strength, even in countries with severe economic problems. Increasingly our products are being viewed as productivity engines that can spur real growth wherever they are applied."

It would be reckless to say that IBM's business is somehow impervious to economic trends—either up or down. In South Korea, where basic industries such as textiles and autos are putting down roots, the current 9 percent growth rate is similar to that of Japan's in the postwar decades. Buoyed by an expanding economy, IBM South Korea's business is bounding ahead. So, too, in oil-rich Venezuela, where the sole impediment to the economy is a shortage of labor, both skilled and unskilled.

In contrast, past recessions in the U.S. have unquestionably caused a slowdown in customer orders. But the company's business, although not immune to economic down drafts, at least appears to resist economic trends in many instances. In fact, customers in some countries view IBM products and applications as an antidote to some of the economic ills that afflict them.





Take Italy, affected in recent years by political ferment and severe economic problems—including inflation and a decline in real growth. Despite it all, IBM Italy's sales rate in the mid-Seventies, says E/ME/A Vice President Billy C. Christensen, was higher than that of any other country in Europe.

"If you try to reconcile that with the environment," says Christensen, "you can't make the two things meet."

Comments Sheldon I. Euler, GBG/I vice president, operations, for the major European countries: "People in the U.S. tend to worry about Italy's political, social, and financial stability. I have to believe our people there don't let these worries influence them."

The level of mechanization in Italy is lower, Christensen points out, than in most other European countries. On top of that, there is still inflation. Overlying that, this year's series of product announcements has brought dramatic gains in price/performance.

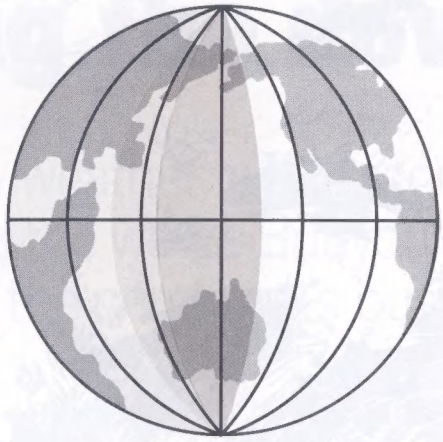
"Roll these things together," he says, "and add in a drive to do many things that you cannot do without computers—and you can account for our business."

All these factors appear to be at work at the Italian Social Security System and in service-oriented industries such as banking. The government agency has some 200 IBM 3790s in offices scattered about the country. Its system handles not only pensions, but other types of transfer payments such as medical benefits. "This is one of the finest Systems Network Architecture applications in the world," says Christensen, "and has made it possible to double the volume of transactions since the first 3790 was installed in 1976."

Elsewhere in Europe, IBM's business is exceptionally strong, helped by new products such as the IBM 3033 Processor. IBM Germany, a traditional revenue leader, will have a record year despite that country's scaled-down growth expectations—from the government's 5 percent forecast at the start of the year to around 3 percent. And despite strong competition from such indigenous competitors as Siemens and Nixdorf, which are also doing well.

The General Business Group's greatest strength overseas is the continuing stream of development in both office products and small computing systems. The range of products enables us to serve everyone, from the first-time user to the sophisticated veteran. Our success hinges more on that breadth of opportunity than on economic conditions.

—Frank J. Cummiskey
President
General Business Group/International



In 1962, World Trade accounted for roughly a quarter of the company's revenues. It rose to a third in 1969. In 1975, for the first time, more than half of IBM's *revenues came from outside the U.S.*

In France, some 1,300 small and medium-sized companies went into bankruptcy in August alone—nearly two-thirds more than in the same period in 1974. The high rate of business failures caused a significant number of cancellations among IBM customers. Yet, at latest reading, IBM France, helped by a slight pickup in the economy, will still come out ahead of plan. *Pourquoi?*

"French firms are looking for productivity investment—the kind that does not increase the size of your facilities but improves the way you do your work and lowers the costs associated with it," says Bernard Denoix, IBM France's assistant general manager for finance and planning.

In the United Kingdom, where there has been little if any growth during the year, the General Systems people raised their sales objectives twice during 1977. In this case, IBM is turning in a strong performance in an economy just starting to be fueled by North Sea oil.

The upward trend in IBM's business is evident in many smaller European countires as well—with Denmark, Norway, and Sweden among the leaders.

Concludes Euler: "There are literally thousands of companies without any data processing equipment at all. With products such as the System/32, they can now justify a computer with only one or, at the most, two applications.

"Despite the fact that the economy is off, you're selling a specific prospect—not the economic curve."

Far away, on the other side of the globe, the picture is equally encouraging in the Americas and the Far East. "The 45 countries where we do business vary so widely that generalizations are risky," says A/FE President William W. Eggleston. "Nevertheless, our people seem to have developed a grooved swing for selling those applications that can give customers a competitive jump in productivity or service." The trend holds true for almost every country where A/FE does business, even those with lagging economies.

"Everyone in business in Australia is looking for increased productivity," says Allan G. Moyes, managing director of IBM Australia Limited. "That's particularly true in service-oriented fields such as banking, insurance, and retail, where wages have been going up even faster than the 11 to 12 percent annual gain in earnings for all Australians.

"It's certainly helped us that our products have improved greatly in price/performance during the year."

Management actions have also helped. When the Australian Government introduced tax incentives for capital investment a year ago to get the economy moving again, the IBM organization responded quickly. "Within two weeks, we came up with a new long-term leasing plan that enabled our customers to benefit from the incentives," says Moyes. "The tax incentives," he explains, "did not apply to leases running less than four years."

IBM Australia, with help from A/FE plants as distant as Japan and Brazil, was also able to shrink delivery time for most equipment to an average of 9.6 months in 1977 (compared with 11 to 12 months in previous years) and persuade customers to install the new systems that much sooner. The result: 34 percent of this year's revenues will come from this year's orders.

An uphill battle has also been waged by IBM Canada. Real economic growth, which dropped from 4.9 percent last year to about 2.3 percent this year, has been slower than in the U.S., and inflation has been higher, despite a government ceiling on wages and profit margins. Even so, IBM Canada's DP business has come close to doubling in the last three years. How come? "It's inflation versus price/performance," says Bob Holmes, A/FE vice president, Americas. "While the cost of everything else is going up, computing costs are coming down through the improved capabilities of our products.

"There's also a second factor," he explains. "In the data base/data communications business, it doesn't do you any good to have all the terminals in the world if there's nothing to inquire against. It would be like trying to use a telephone book when the numbers you had to find were unlisted.

"In Canada, as elsewhere, the essential data bases have been assembled. This leads to the volume use of data processing equipment—almost independently of the economy."

Another factor: Canadian sales representatives and systems engineers have boosted their productivity by emphasizing the marketing of standard configurations of the product line—a sales approach that has also helped in Europe.

In Latin American countries, economic conditions vary widely. Many of the developing countries there, as elsewhere, are burdened with heavy foreign debt. As a consequence, they try to reduce imports to stem the outflow of currency.

"However, we're lucky," says Holmes, "because what we produce is not consumed in the conventional sense. Our computers and office products help to increase productivity and cut inflation. And, by doing so, they make these countries more competitive in the world marketplace.

"We're in the right business," he adds. "And, because we are, our products are usually given a high import priority—but it's seldom enough."

The situation in Brazil, which has one of the heaviest burdens of foreign debt, is typical. To right its trade balance, the country has imposed severe import restrictions. How does IBM cope with the problem?

For one thing, the company manufactures computers and typewriters at Sumaré, near São Paulo—something it was doing before import restrictions were imposed. In addition, IBM is vying with a large number of competitors for government permission to make small computers (the Sumaré plant turns out System/370 Model 148s). In the meanwhile, IBM people scramble to meet growing customer requirements with available equipment.

"But despite these constraints," says Holmes, "the DP business in Brazil is robust. Of course, we could do better without import quotas. But that's a little like saying that the stock market would do better without credit restrictions. I'm sure it would—but we have to live in the real world. Our people are very used to succeeding under real world conditions. That's the fundamental reason behind their success."

In a number of Latin American countries, the company is prevented from bringing in IBM Memory Typewriters, magnetic media machines, and Copiers. "We think these constraints are temporary," says Gordon Williamson, GBG/I vice president, operations, "but temporary can turn out to be a very long time."

Meanwhile, OP is doing well with electric typewriters produced within the Latin American Free Trade Area in Mexico, Colombia, and Brazil. "All of the factors that made electric typewriters acceptable over manuals in the U.S. and Europe," says Williamson, "are now working for us in Latin America and the Far East.

"These products have to be cost-justified. That's happening as wage rates continue to rise, as they are doing rapidly in Brazil, Mexico, Venezuela, and many other developing countries."

Banking is a standout growth industry for IBM in many Latin American countries. "We entered the financial area several years ago with applications especially suited to our customers," comments Salvador F. Covelo, president of IBM Venezuela. "Today, with the IBM 3600, we are rapidly expanding on-line banking throughout the country."

Why should the most advanced banking networks spread so rapidly in developing countries?

"The situation," says Holmes, "is no different in Caracas or Bogota than it is in Chicago or New York. If you have a number of banks all out to get the lion's share of the business, the best way for them to compete is to offer more and better services. On-line equipment is the most effective means of doing this."

In the Far East, Japan is to A/FE what Germany is to E/ME/A—the largest and most competitive marketplace. Both countries, known for their "locomotive" economies, have experienced less than optimum growth in 1977, at least compared with their records of the postwar period. Japan, geared heavily to exports to pay for imported oil and raw materials, piled up a $10-billion trade surplus through August. But its domestic markets have lagged, with industrial plants operating at about 20 percent below capacity.

"Nevertheless, IBM Japan has been able to come up with its best year ever—despite aggressive competition," says Howard G. Figueroa, A/FE vice president, Far East. "We have stiff competition, including Japanese firms, in other areas such as Australia and New Zealand. But in Japan, we face some of the toughest competitors in the world on their home ground."

IBM Japan has been able to do so well, Figueroa points out, because it is a highly motivated, highly trained organization. Also, the country itself has been among the first to recognize the productivity value of computers. One reason: Japan's prosperity depends on being as competitive as possible in export markets. Computer-control techniques have been extensively applied to steel manufacturing, shipbuilding, and other export-oriented industries.

Another motivation, according to Gordon Williamson, is that Japan, in contrast to many areas of Asia, has experienced an increasing shortage of skilled workers, coupled with rapidly rising wage rates. "They've had to invest in capital goods and labor-saving equipment," he says, "because that was really the answer to their problem."

IBM Japan has been able to hone its capabilities still further by introducing a number of products especially suited to its local market. Among them: a banking terminal keyed to the habits of thrift-conscious Japanese workers, who descend on banks every payday to make cash deposits of part of their earnings.

A French pharmacist named Emile Coué once had the whole world chanting, "Every day in every way, I'm getting better and better." Through autosuggestion, he believed, people could make it so. Today, there seems to be a reverse approach at work, with some financial leaders, perhaps unwittingly, trying to talk the world into deeper recession. But, happily for IBM, its overseas business this year has been decisively bucking the trend. ■

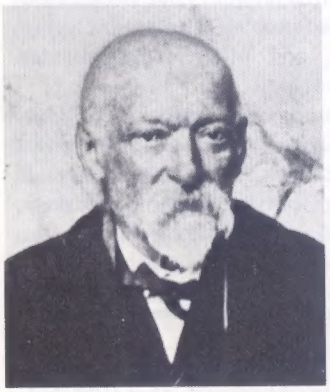
1977 confirmed that new product announcements, like high-end processors and display terminals, enable us to cope with a sluggish economy. We were also helped by the banking industry's ability to withstand adverse conditions, the growth of teleprocessing, and the increased productivity of our sales force. These factors will be working for E/ME/A in 1978.

—Jacques G. Maisonrouge
Chairman and Chief Executive Officer
IBM World Trade Europe/
Middle East/Africa Corporation

The success of our country organizations in 1977 shows very clearly that IBM dedication and know-how are the best antidotes for the world's economic ills. So, in spite of the continuing problems of slow economic growth, inflation, and growing trade barriers, we are confident that our people will turn in another outstanding performance in 1978.

—Ralph A. Pfeiffer, Jr.
Chairman and Chief Executive Officer
IBM World Trade Americas/
Far East Corporation

CEZANNE
THE LATE WORK



Could moody, volatile Paul Cézanne look in on New York City's Museum of Modern Art, he might be roused to the schoolboy shout with which he sometimes terminated what he considered a satisfactory sitting. *Cézanne: The Late Work,* an exhibition jointly sponsored by IBM and the National Endowment for the Humanities, opened October 7 for a three-month stay and brings together, for the first time anywhere, 70 oils and 54 watercolors from the last 11 years of the artist's productive life.

The task wasn't easy. Exhibit directors William Rubin, the museum's director of painting and sculpture, Professor John Rewald, of the Graduate Center of the City University of New York, and Theodore Reff, of Columbia University, spent the past several years coaxing private and government collectors in 14 states and 8 foreign countries to share their Cézannes with an eager public. French cultural officials, in return, exacted a promise that after the New York run and a January-through-March visit to The Museum of Fine Arts in Houston, Texas, the exhibit will move to the Louvre's Grand Palais in Paris in the spring of 1978.

Cézanne would have appreciated the irony. He was 56 before he had his first one-man show—at the Paris gallery of his dealer, Ambroise Vollard. And he died 11 years later, calling out, in his last delirium, the name of a museum director whose refusal to accept his paintings had enraged him. Only a small band of critics and young artists sensed, during his lifetime, that the lonely, emotionally troubled recluse, who seldom ventured outside his native southern France, would revolutionize the course of modern art. As the paintings of the current exhibit indicate, the luminous tones of his late watercolors and increasing complexity of his oil paintings lead to the Twentieth-Century abstractionism of Braque, Picasso—even Jackson Pollock. He was, said Henri Matisse, "the father of us all."

Paul Cézanne was born in Aix-en-Provence, in 1839, the son of a self-made banker, and it was a source of both strength and frustration that throughout his life he remained financially dependent upon a father who had wanted him to study law. After a halfhearted attempt at law school, he soon, with the support of his mother, gave in to the passion of his life: putting down on canvas what he saw around him, not by copying nature with the mirror-like exactitude of paintings found in the art salons, but by relating forms and colors in such a way that, while his pictures remained recognizable, they were strong with the emotion he felt about what he saw.

The artist never felt satisfied that he had completely captured what he sought. "I am always studying after nature," he wrote a painter friend toward the end of his life, "and it seems to me that I am progressing slowly . . . I have sworn to myself to die painting." On October 22, 1906, at the age of 67, he died of pneumonia, contracted by being caught in a rainstorm while painting Mont Sainte-Victoire. —CLAIRE STEGMANN ■

1. Mont Sainte-Victoire Seen from Les Lauves
1904-06
Oil on canvas, 23⅝ x 28¾ in.
Kuntsmuseum Basel

2. Château Noir
c. 1904
Pencil and watercolor, 16½ x 21¾ in.
Collection Mrs. Potter Palmer II

3. Still Life with Apples and Peaches
1905
Oil on canvas, 32 x 39⅝ in.
National Gallery of Art, Washington, D.C.
Gift of Eugene and Agnes Meyer

4. The Red Rock
1895-1900
Oil on canvas, 35⅞ x 26 in.
Musée du Louvre, Paris, Walter-Guillaume Collection

5. The Gardener Vallier (Presumed Portrait of Cézanne)
1905-06
Oil on canvas, 39½ x 32 in.
Private collection, Switzerland

6. Trees Forming a Vault
Watercolor, 17½ x 24½ in.
Estate of Henry Pearlman, New York

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STITCH IN TIME

With Satellite Business Systems, a new and improved way to high-speed, low-cost data communications. In 1981 you'll see it when those dishes begin appearing on rooftops.

by Harrison Kinney

IT'S been 18 years since IBM introduced the word *teleprocessing** to the data processing industry. The company's first compatible family of System/360 computers would come into bloom only five years later, in 1964, and industry experts would soon be predicting a giant leap forward in the growth of nationwide data processing networks.

Few were disappointed. Industry experts estimate that data base/data communications systems, terminals, and communications products have quadrupled from fewer than 250,000 units as late as 1970 to more than a million today. And industrywide revenue from terminal systems, estimated at about $3.5-billion in 1975, is expected to reach $11-billion by the end of the decade.

But for large-systems users, it's not all wine and roses—especially when the monthly telephone bills come in. For with more and more interconnections, the cost of transmitting data is becoming a factor of major importance in communications-based systems.

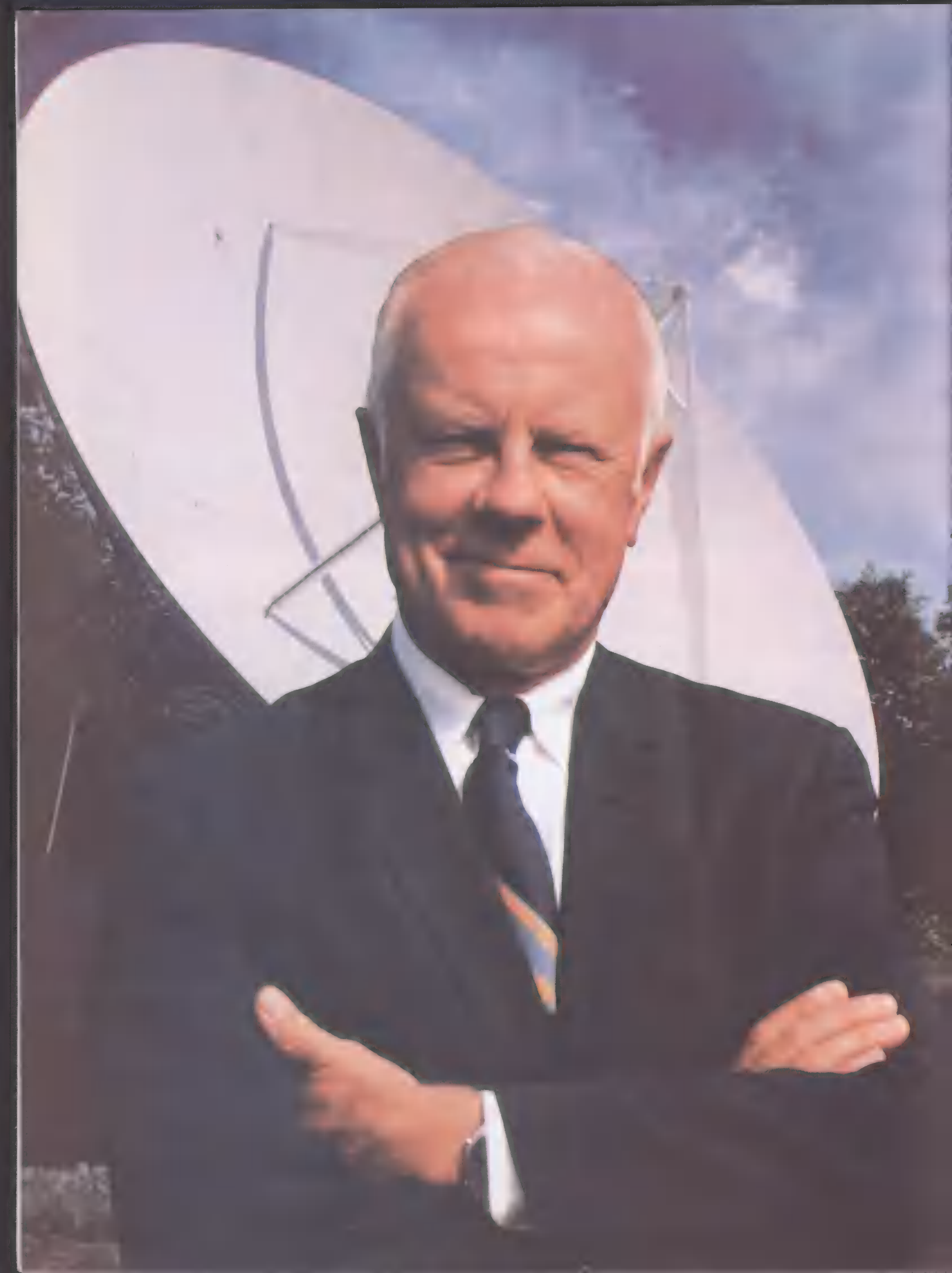
Ironically, this is happening at the very same time the data processing industry is rushing headlong into still another cycle of vastly improved price/performance. So if the industry is to realize its full growth potential, ways must be found to faster and cheaper means for the transmittal of data.

IBM is exploring one such way. The company has joined with two others to form Satellite Business Systems, a move designed to give integrated voice and data their place in space and point the way to still larger, more economic data communications systems.

SBS is a joint venture—IBM's first—a partnership formed by subsidiaries of IBM, COMSAT General Corporation, of Washington, D.C., and The Aetna Casualty & Surety Company, of Hartford.

Such a partnership makes sense. To IBM's expertise in computers

* The use of telecommunications equipment to transmit data between computers, or between terminals and computers.



and systems communications, COMSAT brings 15 years of experience in satellite communications. And Aetna, with significant experience in diversification, is an innovative user of widespread data processing systems.

In 1980, SBS plans to loft its first communications satellite into space and hang it in an orbit 22,300 miles over equatorial South America, a point from which it can broadcast to all 48 contiguous states in the U.S. It will be part of a service available to large organizations with the need to move large volumes of voice, data, and image traffic at high speed from point to point within their communications networks. Costs of the satellite system are estimated at one-half billion dollars.

What induced IBM to undertake the venture?

Two reasons, says John R. Opel, IBM president and a member of the SBS Partners' Committee: "One, technical; the other, financial."

The financial reason is easily explained. "We've always been on the outlook for good investment opportunities," says Opel, "and we think this is one."

But it is the technical reason that becomes paramount, for it goes straight to the heart of the industry's mounting need for improved data communications.

Explains Opel: "Processing data is not enough—what we've got to be able to do is move it to people who need it, wherever they may be, in time, and at prices they can afford. If the information industry is to grow at the rate it is capable of growing, we've got to have more efficient, more economic, and highly reliable integrated voice, image, and data communications systems."

(Continued on page 16)

So who needed an automobile before it was invented?

NO decisions affecting Satellite Business Systems, the new specialized common carrier, seem to have been left to chance. Ask SBS President Philip Whittaker why he and his 200 people are headquartered in McLean, Va., a Washington, D.C., suburb, and his answers are ready and good: "Our major operating commitments are here. We deal with the Federal Communications Commission constantly. Key elements of our Earth stations—in software and hardware—are being developed in Gaithersburg. Our technical experiments with COMSAT are in Clarksburg, Md. We're already on our way toward filling this six-story building, and I'm not sure where we'll be when we reach our full complement of 550 people about 1980, but it will be in this area."

Whittaker is a courtly, able IBM veteran who began in sales in 1946, sold to the Government, and became a Federal Systems Division vice president in 1965. After a short leave of absence, he returned to IBM, and was soon assigned to the IBM study group that, in 1972, began exploring the potential of satellites for handling IBM's internal communications.

Last August, to reinforce the separation of SBS operations from those of its parent companies, Whittaker and 50 other IBM people resigned to augment the cadre of SBS's predecessor company, CML, along with former employees of COMSAT and Aetna.

"This is not an IBM alumni club," Whittaker says. "For practical reasons: Our needs are for people with more experience in designing satellites and Earth stations; in constructing satellite communications networks; in preparing rates and tariffs and justifying them to the FCC. And with other common carrier skills. We'll be building our engineering and marketing staffs with a healthy mix of people not associated with the parent companies."

IBM's interests are represented on the nine-man Partners' Committee by IBM President John R. Opel; B. O. Evans, IBM vice president, engineering, programming and technology; and Allen Krowe, IBM vice president and head of the System Communications Division. (Evans also serves on SBS's three-man Executive Committee.)

"Our former COMSAT employees are especially helpful because of their long experience in satellite communications. They know what will work and what won't. We've been spared having to reinvent the wheel dozens of times," says Whittaker.

SBS will build and manage its system but will have no production facilities. Vendors will provide the components of the new satellite networks. "We study all the alternatives proposed," Whittaker says. "And go with the best combination of quality and price. We have to. We'll be selling our services against highly competitive common carriers."

SBS plans to launch two satellites in 1980, one a backup for the other. If the satellites are carried aloft by the Space Shuttle, the cost—from research and development to activation in space—is expected to hit $33-million per satellite. If they have to be launched by the Delta rocket—and they're designed for either launching—the cost will go up to an estimated $48-million per bird.

But detailed examination of the needs of large information users convinces Whittaker that there is substantial profit ahead.

"So far, only a few pacesetting users see the need for digital, high-speed data transmission integrated with other telecommunications requirements," he says. "But, after all, who knew they needed an automobile before it was invented?"

"For a long time, business communications was regarded as the weather is," Whittaker recently told General Electric's senior executives at their corporate headquarters in Fairfield, Conn. "Something you have to live with and can't do much about. We hope to change the perception, not only with better communications, but also with the chance for the user to *manage* it for the first time. Because of the growing complexity and cost of communications, it deserves more management attention than it's been getting."

Whittaker sees digital, high-speed computer data transmission as the area of "explosive growth" for SBS. But, along with it, he foresees other important—and profitable—uses for the system. For example:

Tele-conferencing. Getting people within sight and sound of one another over television, though miles from each other, for savings in time, travel, hotel and conference room rentals.

Facsimile. The Wall Street Journal, for instance, is transmitted by communications satellite today, in facsimile, to remote printing plants. One page takes from three to five minutes to transmit, using the present analog rate. SBS digital transmissions will be up to 20 times faster.

Strong suspicions that SBS may be onto something are now galvanizing other common carriers into competitive designs for future satellite services. Whittaker knows that by 1980, SBS's birds will be floating among other advanced satellites, too.

"That should accelerate the move from low-speed to high-speed transmission throughout the data processing community," he says. "All we're asking for is the chance to compete fairly," he adds, jerking a thumb toward the ceiling. "And there's lots of room up there in space for competition."

SBS President Philip Whittaker

(Continued from page 15)

As IBM moves into the satellite communications industry, what are the difficulties that must be overcome by SBS?

The answers are, in part, technological; in part, economic; and it is difficult to separate the two.

Most data traffic today is carried the same way as an ordinary telephone call over the conventional land lines and microwave relays of the regulated common carriers. But costs have been getting burdensome as systems expand with more and more data on the telephone line.

Those high costs stem principally from a technical limitation in the telephone system. The lines were designed and developed for voice communications. To move digital information, it becomes necessary, first, to convert that data into an analog mode to pass through the system and then reconvert it to digital form for the business machine.

This not only calls for costly electronic equipment and programming at both ends, but it also brings about an enormous slowdown in the message rate. For example, it would take a seven-hour long-distance telephone call to move the contents of a reel of tape across the country. The high-speed digital transmission proposed by SBS would do it in three minutes.

In recent years, both the older common carriers and the new, specialized carriers have been adding digital capability to their cable and microwave lines. But not of the economy or speed needed for the effective transmission of computer data in great volumes. This may be one reason why, despite the proliferation of computer systems, data still accounts for less than 20 percent of the line load.

Meanwhile, since 1969, an increasing number of specialized carriers with land-based microwave systems of their own have been nibbling away at the business of the common carriers. But most of these systems, too, have been designed primarily for voice, rather than high-speed data transmission. And they, too, are beset with inherent limitations: Because microwaves travel a straight line and cannot be bent to follow the curvature of the Earth, a substantial number of relay stations is required to carry the traffic any distance. In addition, these stations introduce noise and distortion, and degrade the signals.

With the recent advent of domestic commercial satellite communications, these limitations have been overcome. For now a single microwave station in space can span a continent.

But once again, those space stations were designed primarily for voice. And traffic had to pass through the same old ground-based telephone systems to connect the user to the Earth station that linked up to the satellite.

Thus high-speed data transmission again found itself out in the cold—in space, as it had been on the ground.

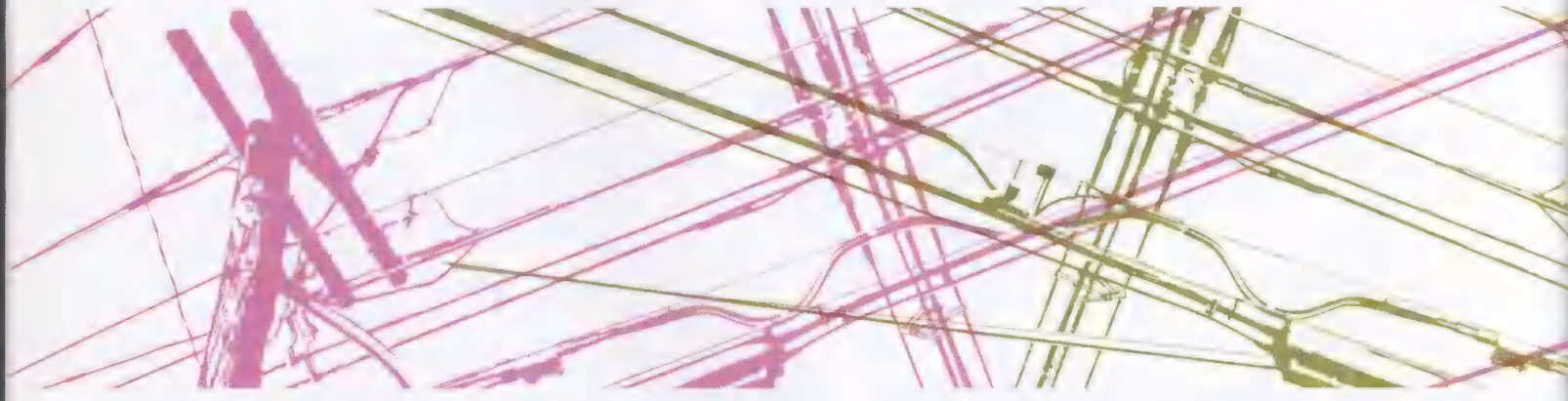
Enter B. O. Evans, IBM vice president, engineering, programming and technology, who is generally viewed by his associates as "the visionary" who became the marriage broker for IBM and SBS.

First, as president of the Federal Systems Division, and later as head of the Systems Development Division and its successor organization, the System Communications Division, Evans, along with others, foresaw that satellite communications, if properly designed, could break this communications logjam and open the way to new opportunities in data processing.

Long before low-cost computer technology began to usher in large data base systems, Evans was on his soapbox.

"We've always had to design hardware and software," he says, "with costly interface devices, just to plug them into phone lines where they were locked into a guaranteed slow rate of transmission. For a time that was tolerable. We could live with it before computers became truly high-speed machines and before data communications became a widespread way of life. But today it's ridiculous.

"It's doubly ridiculous," he points out, "to find those same limitations being built into satellite communications systems. Our



For that high-flying data, some high-class support

STARTING early next year, SBS plans to provide IBM with satellite service, via time leased on an RCA bird. Says Allen Krowe, who heads the System Communications Division: "We'll soon be using SBS services for voice traffic and the heavy data loads between Poughkeepsie, Kingston, and Raleigh, on the East Coast, and Los Gatos on the West. This will realize solid savings. After 1981, with the SBS system operational, we'll gradually phase more terrestrial parts of IBM's internal information and communications network into satellite communications."

That doesn't mean IBM's network will go entirely satellite. There are too many short hauls to justify Earth stations at every traffic point in the network.

IBM will be not only an SBS customer, but a supplier, if all goes as planned. SCD in Gaithersburg is responding to the terms of two joint development contracts with SBS: (1) for a software package that will monitor all SBS customer networks, and (2) for special control hardware for each Earth station. Together, the two products will produce results that led *Fortune* magazine to proclaim, in an article on SBS: "The wizardry is on the ground."

The hardware, which IBM hopes to deliver to SBS in quantity by 1981, is a computerized device that will be able to convert infor-

machines can churn out billions of information bits per second. But to transmit the data, we have to throttle down the computer, take the data off-line, put it on tape, or hold it in a buffer, and then modify it to the slow, voice-grade analog format of the phone line. It's like designing a car to race at 500 miles an hour and having no place to drive it but in a 10-mile-per-hour zone.

"Until now," Evans adds, "satellite communications has done wonders for the telephone, telegraph, and television industries. But the computer industry has remained the poor relation."

A promise of change came in 1971 when the U.S., alarmed by its lagging rate of domestic satellite communications in contrast to that of other nations, moved toward an "Open Skies" policy. This eventually came to mean that any company with the technical and financial means could get into the satellite communications business and compete with terrestrial carriers. More significantly, it could build satellites suitable for digital transmission, yet with signals too high to interfere with land microwaves.

"We waited," says Evans, "but even with those changed ground rules, no one was doing anything in satellite communications to give the data processing industry the transmission speeds it needed."

When the opportunity came for IBM to do something about it, it came almost by chance.

In 1973, a company called CML was formed to provide commercial satellite communications services within the U.S. It consisted of COMSAT and two other corporations.

One day in January 1974, Evans heard that COMSAT was worried about the future of CML. Increasing financial demands were placing so great a strain on COMSAT's partners that they were considering selling their shares in CML.

Evans saw a possible opportunity for IBM to participate actively in satellite communications. He met with IBM Chairman Frank T. Cary in Armonk the next day. Cary authorized a study. Its findings led IBM and COMSAT to apply to the FCC for authorization to form a partnership.

"We needed COMSAT's expertise," Evans says. "And COMSAT was very interested in advanced technology satellites that could handle high-speed data."

The FCC replied that either COMSAT or IBM was free to go into the business separately, or in a consortium in which no partner could own more than 49 percent of the business or less than 10 percent. IBM and COMSAT chose the latter option.

That meant a third partner, and the search began. A number of companies were considered, including Aetna Casualty & Surety.

"Aetna was not only a large data communications user," Evans says, "but also had a fine history of integrity and fiscal soundness. COMSAT and IBM thought them an ideal partner for SBS."

The new specialized carrier, Satellite Business Systems, was authorized by the FCC last February.

"SBS's satellites," says Evans, "will differ from those now operating in space. Besides handling digital traffic at the rate of millions of bits per second, they will be able to pick signals up from hundreds or even thousands of transmitters in customer networks.

"And because the signal strength of the satellite will be so great, those Earth station antennas can be relatively inexpensive —small enough for the SBS customer to install on the lawn, in the parking lot, or on the rooftop."

Little wonder then that Evans is pleased to see SBS taking form:

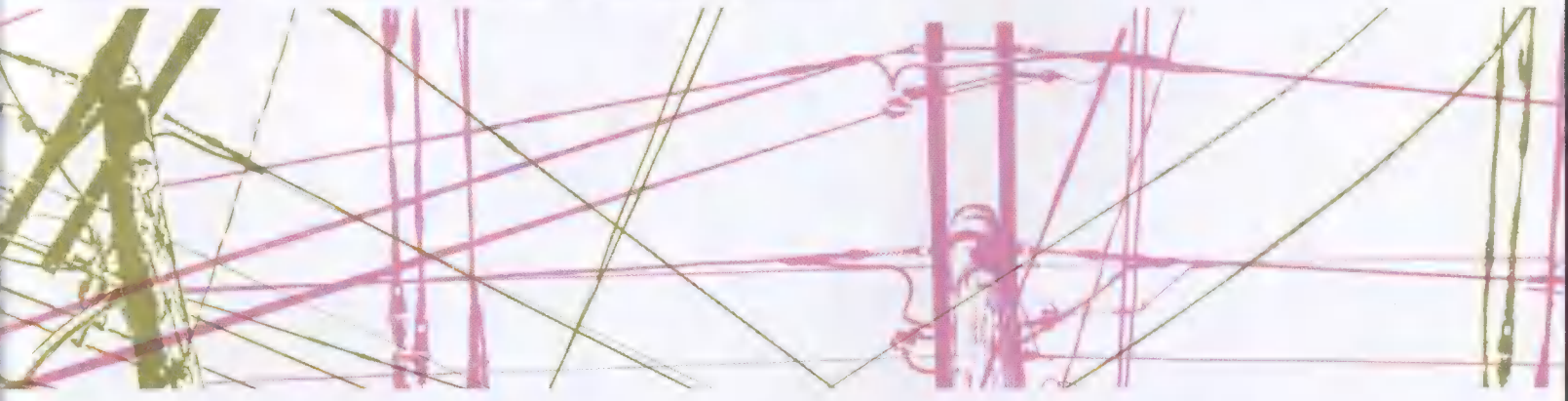
No more forced slowdowns in data transmission speed.

Costly telephone connections between the Earth station and user substantially reduced.

Lower toll charges; it will cost no more for the satellite to transmit to a point on the network 3,000 miles away than to one 300 miles away.

Whatever the 1980s may bring, a change in the industrial landscape is on the way.

You'll be seeing that change as those dishes appear on the rooftops.



mation into a stream of bits appropriate for satellite transmission.

After the Earth station radios its bursts of bits to the satellite, they will be rained back down to Earth, along with messages from other Earth stations in other customer networks.

The hardware at each station will pick out the messages addressed to its location and convert the bits back into message forms.

The software package is remarkable in itself. It will monitor all of SBS's customer networks by (1) providing instructions for managing all customer traffic; (2) recording information to be used in customer reports and billing; (3) generating control and maintenance information on the hardware operations; and (4) overseeing the health of each Earth station.

"We have no lock on any supplier contract with SBS," Krowe says. "We go in like any other bidder. But we don't know of any products in the marketplace today capable of doing for the SBS system what these are being designed to do. They reflect a lot of innovative effort on the part of our people in Poughkeepsie, Raleigh, and Gaithersburg.

"We anticipate that these advanced SCD products will enable IBM to participate in another new and exciting world—the world of systems communications." ■

All this and 'The Nutcracker,' too

Top, left to right: Clarence Darrow, *September 1974*. Love Among the Ruins, *March 1975*. The Tribal Eye, *October 1975*. The Belle of Amherst, *December 1976*. *Bottom:* Eleanor and Franklin: The White House Years, *March 1977*. Something for Joey, *April 1977*. Mary White, *November 1977*. The Nutcracker, *December 1977*.

It has been five years now since NBC-TV presented the hour-long television special on the life and art of Leonardo da Vinci. The film was made possible by a $200,000 IBM grant to the National Gallery of Art. Presented without commercials but offering a booklet on Leonardo upon request, the program drew an audience of 10 million and thousands of complimentary letters. It marked the beginning of the company's major commitment to the television medium.

Since that night of June 20, 1972, IBM has underwritten or sponsored a total of 38 shows in four major categories: drama, ranging from Katharine Hepburn in *The Glass Menagerie* to Henry Fonda in *Clarence Darrow* to Julie Harris in *The Belle of Amherst* to memorable old movies; documentaries, among them the prizewinning *The Tribal Eye*; public affairs specials including, most recently, an Eric Sevareid conversation with Anne Morrow Lindbergh and, on Sunday mornings, *Face the Nation*; music and dance programs that run the gamut from *Dance Theatre of Harlem* to the musical *Sesame*; to live coverage of Queen Elizabeth's Silver Jubilee Gala.

In April, an estimated 47 million viewers watched IBM's most popular show to date: *Something for Joey*, *Mary White*, an ABC Theatre presentation about a spirited young girl and her moving relationship with her famed father, Pulitzer Prize-winning newspaper editor William Allen White, was shown the week before Thanksgiving and was watched that evening by more people than any other program on the air. This Christmastide, the company is sponsoring the American Ballet Theatre production of Tchaikovsky's *The Nutcracker*, taped in Canada and choreographed by international ballet star Mikhail Baryshnikov, who also dances the leading role.

The shows have won many awards. Among others, a total of 23 Emmys for 1975's *Love Among the Ruins* and the three-part *Heaven and Earth*. And 70 commercials have been created especially for television.

"In the past few years," IBM Chairman of the Board Frank T. Cary told stockholders at this year's annual meeting, "IBM has sponsored a number of major presentations on national television that have given us an opportunity to communicate with millions of people across the country about the usefulness of IBM products and services, not only in business and industry, but in helping to solve everyday human problems."

To judge from recent letters arriving at Corporate Headquarters, many TV viewers are getting the message. "Quality product, quality programs," wrote a California housewife after watching *Mary White*. "Keep them coming."

—Lynn Stegmann

Scrambled? Need help?

If there's a bottle in your life—

In recent months, as various state laws have changed, a certain ambivalence may have developed in the national consciousness about marijuana—its use, its sale, its short-term and long-term effects. While it is no longer grouped with heroin and other hard drugs as dangerous, it remains controversial.

And, no matter what state or Federal laws may decree, no matter what an employee chooses to do in spare time away from work, IBM policy is unequivocal:

The use, distribution, sale or possession of marijuana, alcohol, narcotics, sedatives, stimulants or any other controlled substances for non-medical reasons is prohibited on company premises or in any work environment. Employees who violate this policy are subject to disciplinary action including dismissal.

This statement may seem like overkill to the vast majority of IBM employees not involved. "But it is important," says David E. McKinney, IBM director of personnel plans and programs, "to remind those concerned that the policy exists and is—and will continue to be—vigorously enforced."

Although the company recognizes there are differences among the drugs, including alcohol, all such substances can, in the words of Dr. John C. Duffy, IBM medical director, "affect judgment, modify behavior, impair efficiency, and expose employees to hazards." At the same time, the company recognizes the health problems created by alcohol/drug abuse and offers help to anyone who seeks professional assistance. (*See box next page.*)

How serious a problem is alcohol and drug abuse among IBM employees? Considering IBM's thousands of employees, there are only 394 who are currently in company-supported rehabilitation programs. Of that number, all but 24 are alcohol problems. The remaining are hard-drug cases. But Dr. Duffy estimates there might be 800 to 1,200 additional people with alcohol/drug problems who have not been identified or sought treatment.

What constitutes a "problem" is not always easy to define. By IBM standards, an alcohol/drug abuser is "an individual whose use of such substances for non-medical reasons adversely affects satisfactory job performance or interferes with normal social adjustments at work."

The National Council on Alcoholism, which estimates there are more than 2 million alcoholics on business payrolls nationwide, has its own definition of alcoholism in business: "The consumption of alcoholic beverages by any employee to the extent that it definitely and repeatedly interferes with . . . job performance."

George, 42, a marketing representative for 13 years, is a case in point. For two years his manager noticed both his performance and his attendance had slackened. Mondays were particularly bad. George would often be late for work or would phone in ill. A genial person, he always had a "convincing" excuse. At work, he sometimes seemed lackluster, and his reports were invariably late.

Then one morning George arrived at the office with the distinct odor of alcohol on his breath. "It's cough medicine," he explained. "I have a terrible cold and this stuff the doctor prescribed must have some alcoholic content." This time George's manager was unconvinced. He suggested George might have a medical problem and insisted he see the area IBM

Patricia Brooks is a freelance writer and a frequent contributor to Think, *as well as to numerous national magazines.*

or maybe drugs—there's help available.

by Patricia Brooks

medical director. George protested, then finally agreed when he realized that continued poor performance due to his problem could cost him his job.

During diagnosis, George faced the fact that he had an alcohol problem and agreed to treatment. With IBM support, he was referred to a specialist, and he enlisted in Alcoholics Anonymous. Like two-thirds of those who come to the company's attention and seek help, George is now completely rehabilitated and back on the job. "I just regret that I kidded myself for so long," he says. His manager adds: "I kidded *myself*, too, in *letting* George pull the wool over my eyes. It's taught me one thing: to be more alert and sensitive to potential danger signals."

Nobody likes the feeling of being under surveillance. Nor should a manager attempt to play Dr. Marcus Welby, diagnosing medical or psychiatric problems. But a manager *should* be aware of behavioral changes in people that might spell p-r-o-b-l-e-m, and refer them promptly to IBM's medical department for help. Behavioral changes that could be related to alcohol or drug abuse include chronic absenteeism, tardiness, faulty decision-making, frequent mistakes, drowsiness. The National Council on Alcoholism cites an unusual number of morning trips to the water cooler and frequent use of breath sweeteners as clues to a drinking problem.

The personality changes where drugs are involved can be dramatic. Take the case of Nancy. An assembler for three years, Nancy, at 25, had a performance record as a reliable, even-keeled, conscientious worker. Then over a six-month period, her performance deteriorated. She was absent for 32 days (two or three days at a time) with a number of vague, minor complaints. On the job, she made an endless number of mistakes. When confronted with her errors, she reacted defensively and with hostility. She began to blame co-workers for distracting her. She flared up at others.

Finally her manager called Nancy in for a counseling session about her job performance. She admitted some problems existed, but blamed them on "feeling edgy" because of a weight-control program she was on. She produced a bottle of pills with a prescription number and a doctor's name on it. The manager recognized the pill as an amphetamine frequently used as an appetite suppressant, but insisted, nonetheless, that Nancy see the IBM medical director.

It eventually turned out that Nancy had far exceeded the dosage recommended by her doctor and was in fact psychologically "hooked" on the pills. Nor were these the only drugs with which she was experimenting. She was referred to a psychiatrist for counseling, and she began a rehabilitation program. Her problem, fortunately caught in the early stages, was easily resolved. Like George, she, too, is now back on the job.

Since 1957 IBM has had a support program for alcohol/drug abusers. The first step is diagnostic. The medical department then counsels and refers the patient to an appropriate agency or rehabilitation center. Charges for medical treatment by a hospital or eligible practitioner are eligible under the IBM Medical Plans. As in all employee-medical relationships, confidentiality is the rule.

On a business-wide scale, IBM's alcohol/drug abuse problems are relatively small, but they are of concern, both on the human level and in terms of productivity. The National Council on Alcoholism estimates conservatively that business nationally suffers an annual production loss of $15.6-billion due to alcohol-related problems—or a minimum of 6 percent of an average-sized-company's annual payroll. An alcoholic not only works at a lower level of efficiency than a nonalcoholic, but the accident rate is more than twice as high, and absences much greater. No one can measure the dollar damage done by poor decision-making on the part of an alcoholic executive.

Fortunately, business is facing up to the problem. Some 1,200 companies have alcohol/drug abuse programs similar to IBM's. The company's comparative low-incidence rate may be, in part, says Dr. Duffy, because of the relatively low average age—37 years—of IBM employees. Alcoholism, in its later and more identifiable, debilitating stages usually manifests itself between the ages of 35 to 55.

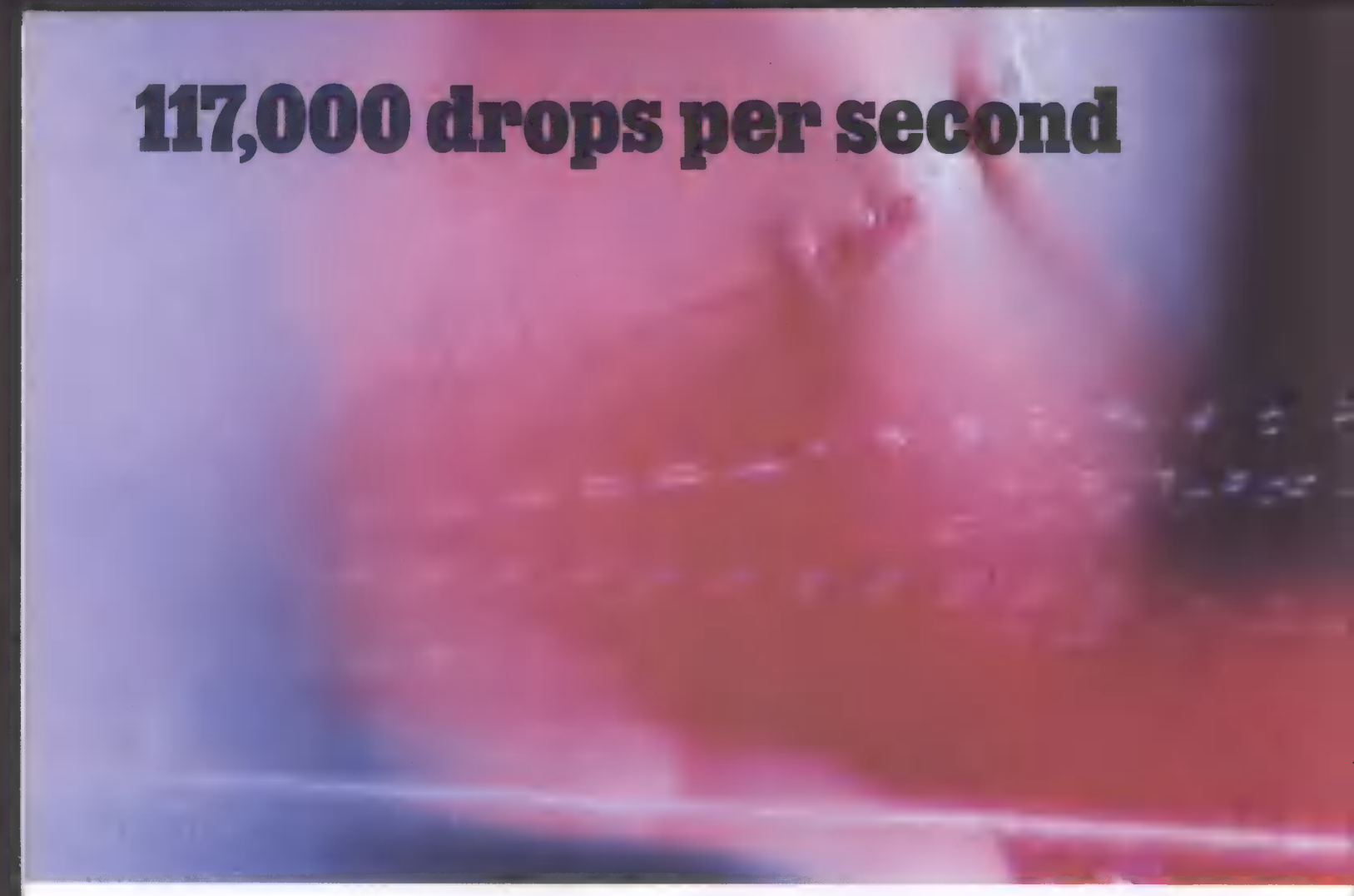
While, in sheer numbers, IBM's alcohol/drug-related problems are happily not many, the fact is, Dr. Duffy notes, "that even one is too many when help is so readily available. There is no need for a single IBM employee to go through such agony when help is here—with full confidentiality—for the asking." ■

Got a drinking problem? Or one that has to do with drugs? If you want help, here's how to get started:

- You can call the medical department directly and ask to speak with the doctor. No need to go through your manager.
- If you want to remain anonymous, fine. But if you wish to identify yourself, the conversation will still remain confidential.
- Records? Yes, a note will be made of your visit. But it will be placed in your medical record, available *only* to the medical department.
- What the doctor recommends will depend upon your problem. He may offer medical advice and counsel. Or he may recommend community resources where you can be helped.
- If your location has no medical department, or if you're part of the field, here are the doctors you can call:

New York area, Dr. Alan McLean 8-375-3608
Chicago area, Dr. Al Ondrako 8-261-5961
Los Angeles area, Dr. Bill Martin, Jr. 8-285-4238

117,000 drops per second



Of ink. Out of a jet one-third the diameter of a human hair. How IBM scientists came up with the ink jet printer. Lord Rayleigh would be pleased.

by Richard Bode

In 1879 the eminent British physicist, John William Strutt—better known by his inherited title, Lord Rayleigh—published a technical paper in the *Proceedings of the Royal Society* in which he described how a jet of water would break up into droplets.

It was a remarkable treatise from the scientist who is best known today for his discovery of argon, his theory of sound, his work in electromagnetics, and his startling explanation of why the sky is blue.

For his prodigious contributions to science, Lord Rayleigh was awarded the Nobel Prize in 1904, 15 years before his death. But it wasn't until 1976, nearly a century after he published his seminal work on jet streams, that IBM engineers in the Office Products Division were able to convert his principles into a high-quality ink jet printer.

For OPD, the virtues of ink jet printing reside in a combination of cost, quality, speed, and low noise level. Other printing methods, like lithography, offer higher quality; still others, like line printers, greater speed. But none matches the ink jet printer's ability to give the users of word processing the meticulous results they want when they want them, and at a price they can afford.

IBM wasn't the first to recognize the possibilities in Lord Rayleigh's work.

In the early 1960s, a scientist at Stanford Research Institute built an oscillograph that used the ink jet process to record electrical signals. About the same time, two engineers with the Clevite Corporation patented an ink jet printer that could actually form characters. Subsequently, A. B. Dick Company acquired these patents and built an ink jet printer that served as a computer terminal.

IBM entered into a cross-licensing agreement with A. B. Dick in 1972 after an OPD advanced technology group in San Jose determined that the jet process could produce typewriter quality printing. What OPD wanted was a new printer that could match its Selectric Typewriter in quality and outpace it in speed.

The IBM Selectric Typewriter is an impact printer; its type element forms characters by striking the ribbon onto the paper. But the ink jet printer doesn't de-

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Richard Bode, a frequent contributor to Think, *writes extensively about technology, business, and science.*

pend upon impact to create symbols, letters, or numbers. Instead, a steady stream of tiny ink drops are squirted directly onto a sheet of paper like so many accurately aimed drops of rain. "We wanted to come as close as possible to printing 100 characters per second," says Bill Buehner, a program manager in the future products area, and the man who managed the ink jet technology team in Lexington, Ky. "We wound up with a product that could print up to 92 characters per second, more than six times faster than the Selectric, without any appreciable loss in quality."

Buehner is a soft-spoken, tenacious man who likes to plug away at technical problems. An electrical engineer, he had been working on noise control of IBM's office products when he was put in charge of the ink jet technology project in 1972.

It wasn't long before Buehner and the half-dozen engineers working with him ran into the unexpected. One of the surprises was expense—that of dry cleaning bills. During initial testing, misdirected ink jets splattered walls and also stained clothes.

Buehner says that anyone who has ever sprinkled a lawn with an ordinary garden hose can appreciate the technical difficulties. "As the stream emerges from the nozzle," he says, "it forms random droplets that fall pretty much where they may. But *random* droplets were the last thing we wanted."

Two technical hurdles seemed insurmountable during those early days. The first was to create an extremely fine ink jet—about one-third the diameter of a human hair—that would break up into drops of uniform size and spacing. The second was to accurately deflect those drops onto different paths so that they would form characters upon striking a sheet of paper.

The engineers put together a number of miniature components that could meet the precise performance requirements. They devised a sealed container that can hold six ounces of ink (enough to print about 5 million characters). A pump, about the size of a cigarette lighter, pushes the ink through a tube into a nozzle 3/16 of an inch long and shaped like a truncated cone. The ink jets forth from an orifice 1.3 thousandths of an inch in diameter, emerging as a fine stream. This stream almost immediately breaks up to form drops at the incredible rate of 117,000 per second.

At the instant the jet stream breaks up, it passes through a charging tunnel that puts an electrical charge on only a few of the drops. (On the average, a mere 146 are needed to form a character.) The drops continue through an electrostatic field created by high-voltage deflection plates. The charged drops are deflected onto the paper. The angle of deflection depends mostly on the magnitude of the charge. The uncharged drops are trapped by a gutter and recirculated. From nozzle to paper, the drops travel at speeds up to 40 miles per hour over the grand distance of about one inch.

To obtain uniform droplets, the engineers relied heavily on Lord Rayleigh's principles governing the instability of a fluid jet stream. His analysis informed them that the jet would normally break up into a stream of drops of random size and spacing, but that drop formation could be controlled by vibrating the ink at a fixed frequency within the nozzle cavity.

This was done by attaching a ceramic crystal to the wide end of the nozzle. Voltage applied to each face of the crystal forces it to flex like the taut membrane

on a drum head, vibrating the ink. With each pulse, a uniform droplet forms from the ink jet stream.

Buehner says, however, that by far the most troublesome task lay in determining the proper charging voltage for each drop. "The process didn't lend itself to theoretical analysis," he says. "We had to build experimental hardware that would let us see for ourselves how ink drops behave in flight in the presence of undesired drop interactions."

The engineers erected what they call a "robot"—a television camera that focused on the jet stream through a microscope and projected an image of the speeding droplets on a video screen. The robot allowed them to study the effects of aerodynamic and electrostatic forces that acted on the drops.

In ink jet printing, a small percentage of drops are selectively pulled from the stream and directed to the paper to form characters. Buehner likens the stream of droplets to a long line of trucks traveling down a highway. Suddenly one truck veers into another lane and meets air resistance that slows it down. Then the truck behind it, riding in its wake, catches up. In the case of drops, sometimes they collide and merge; but sometimes they are repelled by their like charges.

Because of this behavior, the engineers formulated a complex scheme of selecting the drops used for printing from the stream. Information on how to form specific characters, along with other complex data, is used to direct the drops to their correct positions.

Most of the miniature printhead components that actually do the printing are mounted on a carrier (a little larger than the size of a fist), which moves from left to right during printing and makes its return at a velocity 4.5 times that of the printing speed. The deflected drops strike the paper in a steady vertical stream, creating characters from bottom to top. Thus, the printing process depends upon a marvel of timing: the vertical deflection of ink drops and the horizontal movement of the carrier. When the printer is not being used, the ink jet stream is turned off automatically to prevent excessive evaporative losses from the water-based ink. Here again, Buehner alludes to the familiar garden hose. "When we turn the hose off at the spigot," he says, "the water at the nozzle dribbles down. But we can't have conductive ink dribbling down on the high-voltage deflection plate. So we designed a special valve that cuts off the jet almost instantly, and then restores it almost instantly under full pressure."

The ink itself presented difficulties, mainly because it had to be capable of accepting an electrical charge. "That narrowed the field down to a water-based ink," says Don Elbert, a chemical engineer who is manager of ink development and joined the ink jet project shortly after completing work on the IBM Correcting Selectric Typewriter ribbon. "The ink for the Selectric Typewriter ribbons," he points out, "uses a pigment in a wax or oil base that is too thick and too combustible for ink jet printing."

But water, while conductive, causes corrosion. Consequently, anything metallic that comes in contact with the ink must be made of stainless steel. Further, the ink collects fungus spores that can plug the nozzle. The spores were eliminated with a special additive that prevents their growth and multiplication. Another additive was concocted to prevent the printing dye from forming a crust in the nozzle when the printer isn't being used.

The ink contains no special drying properties. "We could design a fast-drying

ink," says Elbert, "but we would sacrifice quality. That's a trade-off we didn't care to make." To make sure the ink dries within 10 seconds, the paper is exposed to a heating element as it leaves the printer.

To mass-produce the jet printer, Lexington had to master new manufacturing methods it had never used. The printer consists of a large number of precision parts that must be put together by hand in a super-clean environment to prevent the collection of particles that might clog the ink circulation system.

Gayle Day, a project manager in manufacturing engineering, likens the production line to the assembly of an extremely complex Heath-Kit in which the parts must fit together exactly so. "There's no forgiveness for mistakes," he says. "Either everything works, or nothing works."

The production process is largely proprietary and therefore closed to public scrutiny. But Day says each tiny part presented tooling and testing problems. The nozzle serves as a case in point.

"We tried all kinds of ways to create the tiny orifice," he says, "including laser beams. Finally, we concluded that our best procedure was to drill the opening under a microscope. The hole is so small we can't determine the diameter by traditional means. Instead, we measure the flow rate of the jet to make sure the hole is precisely the right size."

After final testing, the jet printer is shipped to Austin, where it is incorporated—along with paper-handling and electronic controls—in the IBM 6640 Document Printer. The 6640, in turn, is part of OPD's Office System 6, which has been well accepted by customers, according to Larry Strickland, former program manager for office systems, now manager of the OPD branch office in Austin.

Strickland was closely involved with the ink jet printer for more than a year before the product was announced. He believes the main reason for the 6640's success is the way it fits into a customer's existing office environment. "Our customers," he says, "can use it right along with their current equipment."

The 6640 accepts 200 magnetic cards at a time. It feeds, prints, and stacks paper and corresponding envelopes in sequence. At the flick of a switch, the operator can change type styles, justify the right-hand margin, add headlines and footnotes, even number the lines. Most important, those Selectric Typewriters that now serve as output printers can be freed for typing or data entry tasks.

As Strickland sees it, the ink jet printer is the logical extension in OPD's drive to boost productivity in customer offices: "First, we improved the way our customers enter information. Then, we improved the way they revise it. Now, we've improved the way they print it out."

As to the future of ink jet printing—nobody knows for sure. Scientists at the Research Division, for example, have patented a process for forming an array of nozzles in a thin wafer of silicon or other semiconductor material. They have also greatly added to knowledge of the aerodynamic forces between droplets.

"In the past," reflects Bill Buehner, "the superior print quality required for OPD products could only be achieved with impact printers. The successful development of ink jet technology in the IBM 6640 has changed all that. Now we can have high-speed printing combined with traditional OPD quality. To do it, OPD development people solved technical problems in such diverse disciplines as fluid mechanics, aerodynamics, electrostatics, acoustics, mechanics, and chemistry. We've come a long way." ■

Best of the bunch

That's the claim of American Airlines. They were the first to use computers for flight reservations. Today they use them for just about everything.

by Edward F. Pierce

There are commuters. And there are commuters. There's a whale named Shamu, for one, who commutes between his winter aquarium in San Diego, Calif., and his summer aquarium near Cleveland, Ohio —aboard an American Airlines jet freighter. He's accompanied by a coterie of dolphins and penguins.

Shamu and his entourage aren't the only curiosities one might find aboard an American air freight flight. Some others could be: baby chicks, bulldozers, race horses, turkey eggs (laid in Texas, sold to hatcheries up north), missiles—and even ■ San Francisco cable car that flew East for a promotional stunt a couple of years ago.

That's the freight end of it: 500 million ton miles and $200-million in revenue a year.

Then there are the passengers who, on a given day this fall (October 17, to be precise), flew more than 64 million revenue miles, a figure that could jump to more than 70 million on Christmas Eve. (For the past two years running, air travelers polled by the Airline Passengers Association picked American as Number One among this country's 11 major domestic airlines. It was singled out as the one that gives passengers the best service, the most for their money.)

Speeding them all on their way are American's 36,000 employees, and a battery of data processing equipment: three IBM System/370 Model 168s at the airline's computer center in Tulsa, Okla., two System/360 Model 65s, assorted peripheral and communications equipment, and more than 6,000 terminals in the field.

As James J. O'Neill, vice president of American's data processing and communications services, says: "Computers are woven right into the fabric of the way we operate. I can't think of one single area where they don't have an impact."

There probably isn't one. American Airlines uses data processing not only to keep its books, but also for reservations and ticketing, aircraft maintenance and safety, flight scheduling and forecasting, crew tracking, freight, and fuel conservation.

American was, in fact, the first airline in the world to use computers for flight planning, in the late 1950s. Fully operational by 1964, the system was—still is—called SABRE, developed in a joint 10-year effort by IBM and American Airlines. When it was introduced, it was the largest commercial data processing system in operation in the world. Today, it's still up there among the top ten.

In its most recent (September 1977) earnings statement, American reported revenues during the first eight months of

the year up to $1.7-billion, more than 12 percent ahead of the same period for 1976. A remarkable comeback from the days when the entire industry was reeling from the crunch of worldwide recession and the oil embargo—and the company's quarterly losses were running into the millions of dollars.

The recovery is also remarkable when one considers that the cost of fuel for American has jumped from 12 cents a gallon in 1973 to nearly 40 cents in 1977. The airline uses 1.25 billion gallons a year.

To keep those fuel costs—and consumption—down, data processing has been helping out in several ways, according to Robert L. Crandall, senior vice president of marketing at American. "A flight planning system," he explains, "predicts the amount of fuel required to fly a specific payload from, say, Chicago to Los Angeles. It allows for alternate airports a pilot may have to head for and includes factors such as wind velocity and direction, the number of people aboard, cargo, weight of total load. It also tells the pilot about upper air currents and weather patterns, so that he knows what to bypass—and get the best mileage."

A fuel management system keeps tabs on the whereabouts of fuel throughout American Airlines locations at any given time, and it advises the pilot where to take on fuel, since it costs less in some areas.

With a computerized takeoff power system, the pilot knows what his flap settings should be, thrust required, wind speed—so that he can get off the ground with the minimum amount of fuel. Like starting a car, it takes a lot more gas to get going than it does to cruise along the highway.

While American uses computers to keep its fuel costs down, it also uses them to get its passengers through ticketing, emplaning and deplaning, as painlessly as possible. "With SABRE," says Rod Jurcak, manager of reservations services at the company's New York City headquarters a few blocks from Grand Central Station, "our reservations people have an enormous range of information at their fingertips, literally. Right there at the display keyboard they can tap out not only flight number and fare, but also such things as hotel accommodations, car rentals, flight progress, meals, and movies."

If it's a connecting flight to an overseas carrier, the system will also do currency conversions on the price of the seat on any other airline—any of the world's 150. American offices are found all over the world, but its extraterritorial flights don't go beyond Canada, Hawaii, Mexico, and the Caribbean.

A recent SABRE innovation during the past year or so is the one-stop check-in. No longer does a passenger have to stop first at the ticket counter to check baggage, and again at the departure gate for seat assignment and boarding pass. It's all done at one location or the other.

Reservations operations were recently consolidated from eleven offices to four—in Cincinnati, Hartford, Los Angeles, and the Dallas/Fort Worth area. All incoming calls are channeled through these four locations to the computer center in Tulsa. American has some 2,500 people handling those calls—43 million a year. "While a few calls may wait as long as 20 seconds," says Jurcak, "we answer the average call within a few seconds after the phone starts ringing. So, thanks to SABRE, we're able to give good service to the customer, since we have his record right there in front of us instantaneously."

The system will also tell the traveler what day of the week a certain date falls on, or what the next four Friday dates are, for example. And before long, a databank record for the frequent traveler will tell the reservations agent whether a given passenger prefers a window or aisle seat, smoking or nonsmoking section, and what kind of drink he or she prefers.

Reservations, or the Passenger Service System, came first for SABRE, but it wasn't long before American's freight people began looking to it for help.

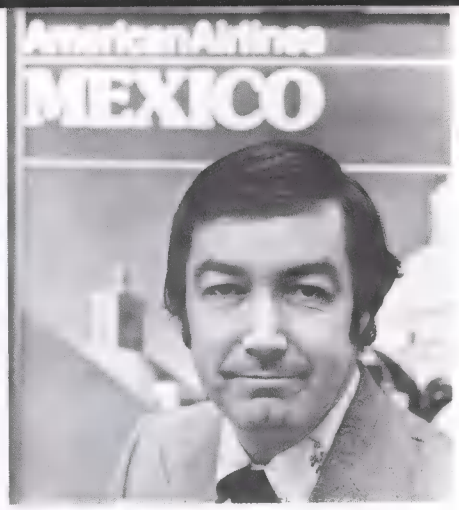
"It was back in the mid-Sixties," recalls George A. Shipman, senior director of freight market plans, "and we found ourselves with certain bottlenecks. One was right at the beginning. The freight would arrive at our terminal and have to sit there while we massaged the paperwork. Oh, we'd get through it eventually, but it was creating major service problems.

"So, we said to ourselves, if we could just get the freight *moving*, and let the paperwork catch up with it. We first experimented with teletype links, the theory being that by the time the freight arrived, they'd have the paperwork at the other end. They could match it up, and everything would be hunky-dory. Well, there was so much to be done with the paperwork even before it could be teletyped that we found the freight was arriving long before. That's when we said to ourselves, 'We've got a computer with the power to handle cargo activity. Why not use it?' "

The answer was a system that completely separated paperwork from cargo handling. The two now come together only when a customer arrives at an American terminal facility for freight delivery or pickup. In between, the paperwork is in one place—the information is actually in the computer system—and the freight is in another. The customer gets a printout document at the end of the transaction. "At this point," says Shipman, "we're doing almost 80 percent of the ratings—how many pieces, weight, the commodity itself, cost to the customer—right in the computer."

At the outset, he says, there was one big problem at the display keyboard: None of the freight people knew how to type. "Most of us were two-finger experts," he recalls. "Still are, for that matter. But we can go pretty fast now. Have to. We have three 747 freighters, each with a 221,000-pound capacity, and nine 707s. That's

(Continued on page 46)



Rod Jurcak, manager of reservations services.

Demetrius J. Tsaras, director of electronic data processing operations, Tulsa Computer Center.

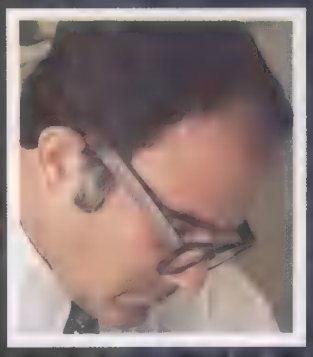
H. Warren Hires, flight captain, flies out of the Dallas/Fort Worth airport.

Cecil Rivera, head of the maintenance shop at Tulsa.

George A. Shipman, senior director, Freight Market Plans.

José Aste and the Incas

A Peruvian IBM scientist looks into his country's pre-Columbian past. And much, much more.



In Japan, it's Kinki, a megalopolitan region of 21 million people stretching from Kyoto to Kobe to Osaka, in need of long-range planning.

In Mexico, there's the matter of water resources, forestry, and wheat acreage.

In Venezuela, the accent is on rural development.

In Thailand, it's civil engineering—at the Asian Institute of Technology, near Bangkok.

In the Philippines, it's rice breeding.

Each is the focus of a scientific partnership program supported by the new World Trade Americas/Far East Corporation, now under way in six A/FE countries, in cooperation with the host governments.

The sixth is Peru, where one of the widest arrays of projects—ranging from investigations of the country's rich pre-Columbian heritage to agricultural studies—is moving ahead on many fronts.

Not long ago, Dr. José Aste, manager of IBM Peru's three-man scientific project group, talked about some of these projects during a visit to A/FE Headquarters, near Tarrytown, N.Y. No stranger to North America, he took his Ph.D. degree, in environmental systems, at Cornell University five years ago, during a sabbatical from the company.

A man of modest demeanor, illuminated by a brilliant smile when he's amused, Aste joined IBM 14 years ago—quite by accident—and between jobs. He was parked outside the IBM building in his native Lima, waiting for a health clinic to open (one of his children needed some tests). As he waited, a friend came out of the building, and while they chatted he asked the friend about job prospects in the company. An interview soon followed, and Aste became an IBM systems engineer.

Dr. Aste's group has been delving into the Inca civilization, decimated by the Spanish conquistadors in the 16th Century. As highly civilized as they were, the Incas had no written language. But they did devise a system of knotted cords, called *quipus*, to keep records. When laid out on a flat surface, they look somewhat like an abacus, with knots in place of the beads. (*Quipu* means knot in the Quechuan dialect of the Incas.) But, as Aste is quick to point out: "It wasn't a calculating system, it was a recording system. You might say it was a very early form of the punched card. But seriously, if we determine the significance of each row and column of knots, we might learn more about the Incas—more about their long-range planning, for example. We're working on it."

Aste's people are also working on cultural studies with the Lim-

versity of San Marcos in Lima (the oldest university in South America, dating back to 1551), and with Peru's National Institute of Culture. They are creating a databank of all the country's archaeological sites and buildings—including Machu Picchu, that magnificent ruin of a fortress city the Incas built high (8,750 feet) in the Andes.

IBM Peru's scientific team is investigating other Peruvian forebears. They include the Mochicas, the Chimus, and the Nascas, who left those massive incisions on the southerly coast of Peru, purported to be landing guidelines for early visitors from outer space. Aste is skeptical about that, although it was seriously discussed in a popular book (*Chariots of the Gods?*) a few years ago.

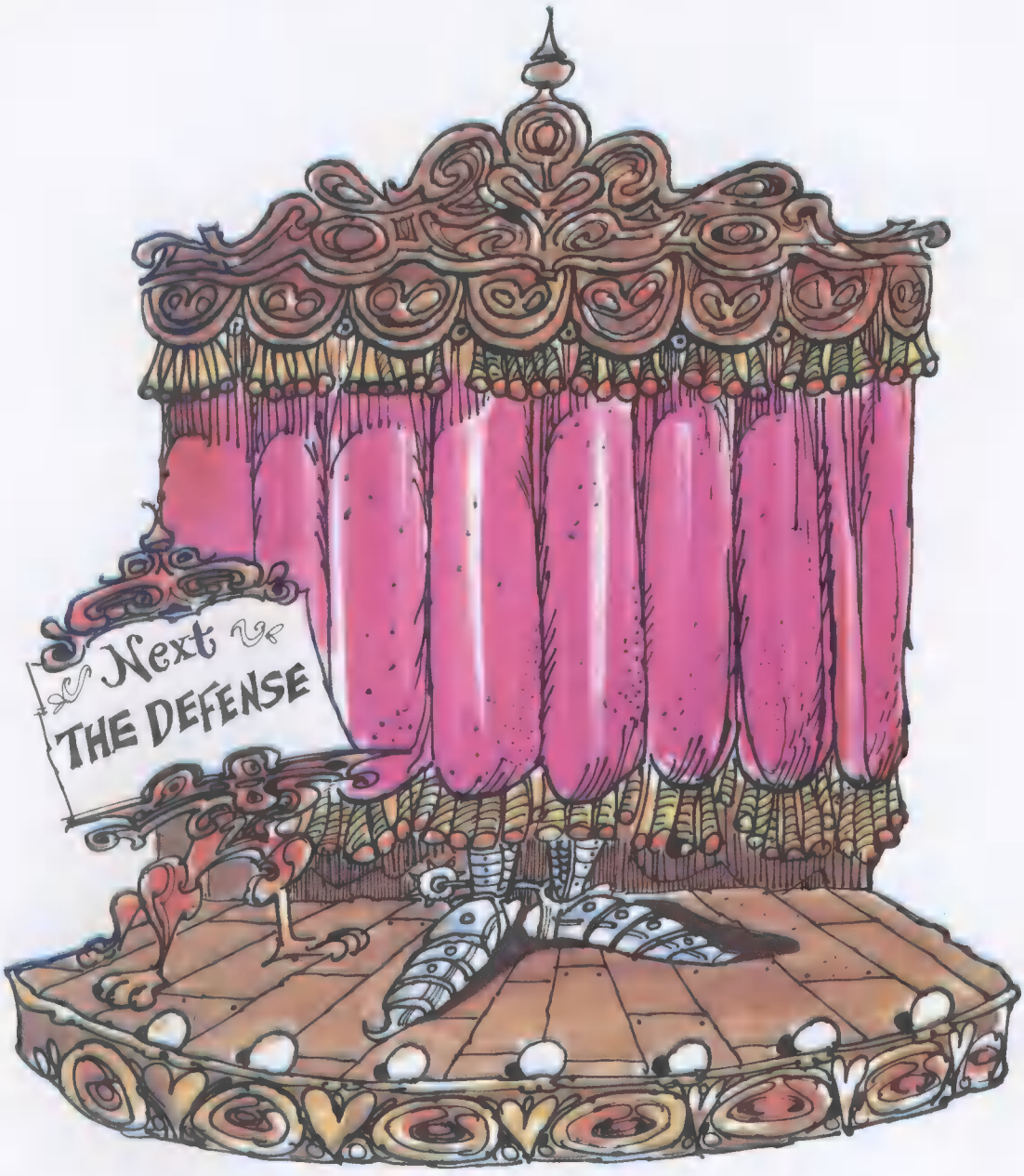
When the Aste crew isn't looking into its country's past, it is involved in partnership programs to study the kinds of food Peruvians eat and to boost farm output. Rice, for instance, is a major food staple and, because of seasonal harvests, is stored in silos throughout the country for equitable distribution. The key question: Where to put the silos so that rice will be where it is needed? The IBM group set to work constructing a mathematical model, with the aid of a System/370 Model 145, to figure out the placement and size of the silos.

"The funny thing," Aste explains, "is that rice is not native to Peru. The *conquistadores* brought it over from Spain, and now we eat more of it than the Spanish do. There are other things Peruvians could eat besides rice—there are thousands of varieties of the potato, for example, and it is very easy to grow. But it is hard to change customs."

The scientific group has also applied mathematical modeling to studies of sugar growth and production, irrigation techniques, fertilizers, and forestry.

Since "seed banks need databanks to handle seed characteristics," as Aste points out, he and his people have been working with Peru's University of Agriculture on a seed bank scheme. The data is used in genetic breeding to produce hardier, disease-resistant crop varieties. The goal of all the agricultural activities is not only self-sufficiency, since Peru must import several foods, but also rural income and rural jobs. That's where long-range planning comes in, to avoid the swamping of Peruvian cities with jobless people.

José Aste's own horizons aren't confined even to the higher reaches of the Andes. He recently returned from a trip in Southeast Asia, where he met with Asian scientists, including IBM colleagues and city planners. Many of the problems in the countries he visited, he found, are similar to Peru's. "In Malaysia we found an almost *identical* point of view about the need for distributed population, with heavy focus on rural development balanced by good urban policy. So the exchange of—how does one say, know-how?—is very, very valuable."—Edward F. Pierce ■



Coming soon, IBM's day in court

In New York, the defense gets set to open its case.

by Ernie Bauer

A growing, but still subdued, feeling of expectancy is becoming apparent on the part of everyone involved with the U.S. vs. IBM lawsuit. Growing because, after two-and-a-half years of trial, the Justice Department's direct case against IBM seems about to end. Subdued because, if anything, the protracted lawsuit has become notorious for taking unpredictable —and sometimes unexplainable—twists and turns.

As far back as March, Raymond Carlson, the Government's lead attorney, was quite certain that the Justice Department would rest its case by Labor Day. Knowledgeable observers took that with a grain of salt. Correctly, as it turned out. Labor Day came and went and, when the brief recess ended on September 12, activity in the courtroom rumbled on as before.

By September 12, the Government's principal economic witness, Dr. Alan K. McAdams, was only five days into his direct testimony. It was to go on for another 26 calendar days, a new long-distance endurance record for the trial. The previous record by a witness was set in the testimony of Frederic G. Withington, an industry analyst with Arthur D. Little, Inc. He was on the stand for 21 days of direct

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examination by the Government and cross-examination by IBM attorneys. It added 3,300 pages to a trial transcript that is now well over 60,000 pages long.

McAdams, an associate professor in the Cornell University Graduate School of Business and Public Administration, is the chief economic theorist behind the Government's charges. Since 1971, he has been helping the Justice Department gather statistics, interview and evaluate potential witnesses and, in general, organize its case.

The first four years, McAdams worked part-time on the case. Since 1975, he has been on leave from Cornell to work full time at the trial. McAdams has the job of tying more than two years of testimony and reams of material and exhibits into a legal package that the Government hopes will prove the validity of its antitrust charges.

The cross-examination of McAdams is being conducted for IBM by David Boies. Boies resumed his participation in the trial after successfully leading IBM's defense against CalComp in California. The CalComp charges were dismissed.

But, even while the Government trial may be nearing a climactic point in the courtroom (after McAdams, says the Government, there are only "a couple" more witnesses before it rests), the opposing legal camps are carrying on a running behind-the-scenes legal and procedural struggle.

One of the problems that has plagued the case since its beginning—and, as a consequence, many maintain, has made the whole legal controversy longer and more onerous than it need be—has been the continuing turnover in the Government's legal staff. Raymond Carlson, as of now, is the only Justice Department attorney who has been involved with the trial since it began in May 1975.

Now, with Carlson leaving the case, and with a change in Administration, new people continue to become part of the scene. There is a new Attorney General, Griffin Bell, and a new Assistant Attorney General in charge of the Antitrust Division, John Shenefield. However, the change that most immediately affects the IBM case is the appointment of Robert Staal, a Justice Department lawyer from San Francisco. He will take Carlson's post as lead counsel for the Government during IBM's defense. One of Staal's first acts in anticipation of his tenure was to ask that the court reopen discovery in a major way and appoint someone who would have subpoena power to reexamine IBM records already produced and to take testimony with respect to certain discovery matters.

In opposing that motion, IBM attorneys focused on what they believe is the Government's real problem: "Plaintiff's present motion . . . [is] . . . a continuation of a very old dispute—plaintiff's continuing effort to make the facts fit its theory.

"Now, however, the dispute is being carried on by new counsel who have received the theory from their predecessors, but who know even less about the facts and who, with this motion, trudge back across old ground seeking something to support the irrational faith that has been passed on to them."

That argument, however, did not sway Judge David Edelstein, who is hearing the non-jury trial. He promptly appointed—and gave broad power to—a person already acting on behalf of Memorex in that company's antitrust litigation against IBM.

So seriously did IBM's attorneys take this threat that they sought an order from an appellate court to overturn Judge Edelstein's ruling for the Justice Department. The Government lawyers have since conceded that this appointment would "appear to be" a conflict of interest and asked the judge to withdraw it.

Another puzzlement: How does the Government's request to seek new materials through still more discovery square with its stated intention to rest its case soon, or with its earlier representation that discovery had been completed and that the case was ready for trial?

Whatever the outcome of this most recent confrontation, IBM's attorneys are gearing up for the day when they will finally get a chance to present the company's case.

While David Boies (who himself will leave the trial, when the Government's economic witnesses are finished testifying, to take a post as chief counsel for the Senate Antitrust and Monopoly Subcommittee) represents IBM in the courtroom, lead attorney Tom Barr is preparing for the next phase and already running into roadblocks and controversy.

One Government proposal—to limit severely IBM's flexibility in specifying and rescheduling witnesses—is tantamount, says Barr, to changing the rules in the middle of the game. It has drawn a sharply worded reply from Barr.

The reason for this attempt to unfairly restrict IBM's method of presentation, says Barr, is simply that the Government's new counsel are not ready. "Even now," says Barr in an affidavit, "almost at the end of its direct case, plaintiff will not say who its next witness will be, much less who all of its remaining witnesses will be, and in what order." (For even though the Government claims to have only "a couple" more witnesses to call, there are at least 20 names on its witness list who are unaccounted for.)

"I ask," continues Barr, "why plaintiff's counsel now believe they can ask the court to order us to do what they have been unwilling, unable, or incapable of doing for three years. Fundamental fairness in our judicial system means absolutely nothing if it does not mean that both sides are treated equally."

A proposal by Barr to pick up the pace of the trial has gotten a cool reception by the other side. Explaining that IBM will open its direct case with a submission of documents, Barr, in a motion filed with

the court, proposed eliminating "the formalistic, elaborate, and routine" procedures that have been in effect until now.

"If we are forced to offer them the way documents and depositions are now offered, we will consume more than a year of unnecessary court time. . .

"If our motion is granted," Barr continued, "I believe that the offering of those documents and depositions can be accomplished . . . within a few days or weeks at most."

A great deal of uncertainty and some confusion continue to mark the trial. But there are some predictables, too.

The Government *will,* eventually, end its case. And when it does, IBM will ask Judge Edelstein to dismiss the charges, pointing out, in its motion, that the Government has failed to prove a violation of antitrust law on the part of IBM.

If IBM's motion is denied (and, historically, the odds are very much against its being granted), the company will begin calling witnesses and offering exhibits in its defense. And the trial will go on.

West Coast Suits

FORRO The outcome of the last three issues raised in the trial of Forro Precision vs. IBM was resolved in the U.S. District Court, San Francisco, on October 26, when the presiding judge entered a judgment in favor of IBM on Forro's antitrust allegations.

The trial had ended a month earlier, when a six-person jury decided that IBM had violated a California law by intentionally interfering with Forro's prospective business advantage because of a police search of its premises. But the jury also ruled that Forro had used misappropriated IBM trade secrets. It then declared itself unable to decide the antitrust issues. Left that way, the antitrust allegations might have had to be retried, with the other two counts going to the U.S. Court of Appeals.

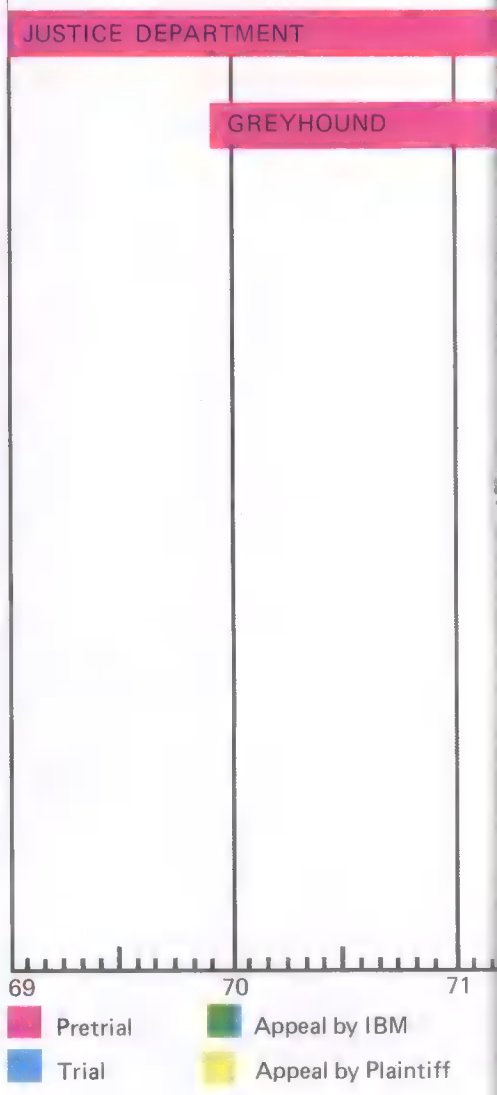
Ruling on a series of post-trial motions, Judge Ray McNichols decided to let the jury's seemingly contradictory verdicts stand, but he entered a judgment for IBM on the issues of monopolization and attempted monopolization.

His ruling was important for two reasons. It was yet another reaffirmation by a Federal court that IBM is not in violation of U.S. antitrust laws, and it cleared the way for the other two counts in the Forro case to go to a Federal appeals court along with the antitrust decision. That court will be asked how a police search for stolen trade secrets could violate any law, for it was that very same search of Forro's premises that resulted in the charge of intentional interference. And the jury said that Forro had indeed used misappropriated IBM trade secrets in making parts for computer peripheral equipment.

MEMOREX After spending the morning of October 26 hearing and ruling on Forro and IBM motions for appeals, Judge McNichols spent the afternoon presiding over another hearing on the other so-called "West Coast cases." The cases, all of them alleging monopolization and similar in nature, were originally consolidated into one proceeding for pretrial preparation as well as trial. Following the CalComp and Forro trials, which were conducted by Judge McNichols, the others have now been sent back to the Northern District of California to the various judges to whom they were originally assigned.

Memorex, for instance, has been returned to Judge Samuel Conti, who ordered that Memorex and IBM submit offers of proof to him on the massive case now scheduled for trial January 9, 1978. Filed under seal, those papers are available only to the judge and the attorneys working on the case. Some light, however, was shed on Memorex's game plan by a Memorex filing in another court.

Where we stand on the lawsuits



The jurist who has been assigned the Transamerica antitrust case, Judge Robert H. Schnacke, asked the plaintiffs and IBM whether it wouldn't be a good idea to have one trial on the common issues. In responding to that query, Memorex attorneys referred to 36 issues in dispute and stated: "If IBM engaged in only *one* of the acts here at issue, it is extremely doubtful that either the United States or any private plaintiffs would have brought the actions which are now pending. It is difficult to

state how many acts . . . would have been required before an antitrust action would have been filed, but the plaintiffs are complaining about a pattern of conduct that covers a substantial period of time and encompasses a large number of acts."

Memorex is apparently uncertain of exactly what wrong, if any, IBM might have done and hopes that if it puts enough issues before the jury something will stick. CalComp tried the same approach and failed.

THE OTHERS Among the other West Coast plaintiffs, DPF, Inc., and Hudson General seem to be content to await rulings in other cases. Meanwhile, CalComp*, in its brief to the U.S. Court of Appeals, argues that the appeals court ruling in Greyhound vs. IBM mandates a retrial of CalComp. IBM has petitioned the U.S. Supreme Court, seeking a review of the Greyhound appeals court ruling, which overturned a directed antitrust verdict for IBM.

Following the directed verdict for IBM in CalComp, IBM Chairman Frank T. Cary said: "We think there ought to be a limit to the number of times we have to relitigate these issues." Apparently that limit has not yet been reached. ■

* Calcomp vs. IBM was the first of the West Coast cases to go to trial. On February 11 of this year, after CalComp had presented its case, the judge granted an IBM motion for directed verdict in IBM's favor. CalComp appealed that ruling.

Beyond that bottom line

The business of business is no longer just business.

by Edward F. Pierce

"Equal opportunity just can't work if people lack the skills to get a job," said IBM Chairman Frank T. Cary to a group assembled for the National Urban League's Equal Opportunity Day awards for 1977. This year they went to IBM and to Franklin A. Thomas, former head of the Bedford-Stuyvesant Restoration Corporation in Brooklyn, N.Y., for "outstanding contributions" to the goals of the League.

Cary had accepted the IBM award, on behalf of the company, at the League's annual recognition dinner, held this year on November 17 at the New York Hilton Hotel in midtown Manhattan.

In his remarks, Cary was focusing on the problem of unemployed youth—particularly black teenagers, whose jobless rate is an alarming 40 percent. "If we really hope to eliminate youth unemployment," he said, "we must begin to move toward something we've never had in this country: that is a smooth transition for every young American from full-time schooling to full-time work . . . We need a relevant system," Cary said, one that will inform and guide students while they are still in school, and that will help them get jobs after they leave.

IBM's support of equal opportunity dates back three decades to a grant to the United Negro College Fund for minority education in 1944. Since then, the company has had a highly visible profile in helping out by:

- Providing jobs, within the company—and outside it;
- Training and education;
- Aiding equal opportunity organizations;
- Supporting minority-owned or -managed banks and insurance companies;
- Buying products and services from minority entrepreneurs.

Jobs. Of the 14,900 new employees IBM hired so far this year, 19.1 percent were minorities and 37.4 percent, women. The U.S. company now has more than 1,600 minority managers and more than 1,200 women managers. (As *Black Enterprise* magazine put it recently: "IBM has consistently been big business' triple-crown winner in the areas of equal opportunity employment, promotion and social responsibility.")

The company's equal opportunity policy is channeled through a variety of affirmative action programs. They are aimed at recruiting, hiring, and training not only minorities and women, but, equally important, disabled war veterans and the handicapped.

IBM has been employing and training the handicapped since the late 1940s. Last spring, IBM President John R. Opel was co-chairman of a White House industry/labor council on the handicapped. Many of the company's handicapped, Opel told those attending the council, had proved to be remarkable achievers and a great asset to the company.

Another project was unveiled in the spring of 1968: an IBM System Products Division plant in the Bedford-Stuyvesant section of Brooklyn, a neighborhood blighted by unemployment and poorly paying jobs. As Cary told the Urban League gathering: "IBM went into Bedford-Stuyvesant in a kind of partnership with Franklin Thomas to test the idea of putting a plant into the inner city area; and we're proud indeed of the 400 men and women there who made that plant a success."

IBM Chairman Frank T. Cary at National Urban League dinner with Vernon E. Jordan, executive director of the League.

Entrepreneurs. In scores of cities across the country, in more than 25 states, IBM's affirmative action comes in another form: buying products and services from minority entrepreneurs—black, Hispanic, and American Indian. The number of these suppliers to IBM has grown from less than 10 in the past decade to more than 350 minority-owned companies doing millions of dollars' worth of business with IBM last year.

Training. While providing jobs for the disadvantaged, or helping them with their business, IBM has also been deeply involved in programs designed to train them for jobs that mean upward mobility.

Just the day before the Urban League ceremonies, the IBM chairman had visited a League training facility in Chicago. As Cary said to the group in New York: "Our first partner in the establishment of a skills training center was the Urban League. We started out in the Watts section of Los Angeles in 1968 and have gone on together with similar centers in Atlanta and Chicago. We have also worked with the OIC [Opportunities Industrial Centers] on skills training in Harlem and Dallas. Eighteen hundred young men and women who have graduated from these centers have found jobs."

Education. Engineering schools in the U.S. —in toto—turn out fewer than 800 black graduates a year, a number that doesn't even begin to meet the needs of industry and business. To help boost that number, IBM has made key grants of $100,000 or more to predominantly black engineering schools such as Tuskegee Institute, North Carolina A&T State University, and to Howard, Southern, and Tennessee State

For many years, IBM has been aiding dozens of community and national organizations supporting the rights of people. Among them are:

The Urban League. One of the oldest (founded in 1910), its aims are still the elimination of racial segregation and discrimination, and helping black citizens and other economically disadvantaged groups to share equally in all aspects of American life.

The NAACP Legal Defense and Educational Fund. It represents civil rights groups as well as individual citizens who have bona fide civil rights claims. Contributed funds are used to finance court actions for such things as equality in schools, jobs, voting, and housing. It maintains the Herbert Lehman Education Fund, through which scholarships are awarded black students; and the Earl Warren Legal Training Program, which helps black law students.

SER, Jobs for Progress, Inc. Founded in 1965 to provide job training for Hispanics, it has expanded to meet the needs of all disadvantaged groups. According to the U.S. Department of Labor, SER is the most effective manpower training program in the nation, based on cost of training and job placement.

The Mexican-American Legal Defense & Educational Fund. It was set up to protect the constitutional rights of Mexican-Americans and to help educate young Mexican-American lawyers.

Opportunities Industrialization Centers of America. A Federally funded job training program for the unemployed and underemployed, OIC trains people in 57 vocational categories to fill job openings of local employers. The program includes counseling, remedial training, and placement.

Americans for Indian Opportunity. This organization was established to help American Indians, Eskimos, and Aleuts with self-help programs at local levels; to educate the public to the achievements and needs of Native Americans. It supports projects in: education, health, housing, job development and training, and opportunities for Indian youth.

Catalyst. A national, nonprofit organization, it helps women choose, launch, and advance their careers. It does so by providing career information and self-guidance material, and by interpreting the needs of the marketplace through a national network of women's resource centers.

Aspira of America. It provides educational counseling, leadership development, cultural enrichment, and self-identity for the Puerto Rican community.

universities. The company is a major supporter of the National Fund for Minority Engineering Students and has awarded grants to strengthen faculty development at black engineering colleges.

IBM also supports 45 programs at public and private universities designed to increase the number of minority students enrolled in engineering and science. For Hispanic and American Indian students, it has supported engineering and science programs at the University of New Mexico, New Mexico State University, and the University of Texas at El Paso.

On the faculty side of the education picture, individual IBM professionals are loaned to minority colleges and universities who request such support—an average of 25 to 30 institutions a year. In addition to emphasis on recruiting and upgrading women in the company, IBM aids educational institutions and organizations that are creating new roles and opportunities for women in society. In support of programs that encourage women in nontraditional careers—particularly business management and engineering—the company has made grants to such (traditionally) women's colleges as Chatham, Mills, Mount Holyoke, Randolph-Macon Woman's College, Simmons, Agnes Scott, and Smith. IBM has also supported the National Council of Negro Women, an organization dedicated to advancing the economic, social, and educational welfare of black women. In 1972, a special program of 15 annual Ph.D. fellowship awards was set up for minority and/or women students studying engineering, mathematics, and science.

Any IBM employee gets an opportunity for affirmative action when he or she is given a leave of absence for social service. This option began in 1970, and since then, more than 500 IBM people have been granted either full or partial leaves to work with minority and community organizations, colleges and universities.

It's been a rewarding experience for these people, and rewarding for the company as well, when they come back with that extra dimension of experience that enriches their job skills.

Another way an employee may acquire that extra dimension is through the IBM Fund for Community Service. It is designed to aid projects in which IBM people are involved as private citizens—social welfare programs, medical, educational, scientific, and cultural activities. Since it got under way in 1972, the Fund has paid out more than $4-million for projects involving more than 11,000 employees.

Next on the affirmative action agenda, as Frank Cary pointed out at the Urban League dinner, is unemployed youth.

"We know very little about what lies behind youth unemployment statistics," he said, "which lump together all kinds of young people, whether they're seeking permanent employment, summer jobs, or after-school work. We know very little about the large numbers of young people who are neither attending school nor working nor looking for work. We know very little about which programs help—and which programs don't . . ."

To get the answers to such questions, Cary said, much more research is needed. And that is why IBM has underwritten a major project of the National Bureau of Economic Research, "Understanding Youth Unemployment."

The job ahead—of providing more relevant training and better job opportunities for the young—won't be easy, Cary concluded. "But we have to do it," he said, "and we have to get moving. We owe nothing less to the coming generation." ■

Jobs, jobs, jobs

With the business humming in all divisions, IBM is back on campus for the biggest hiring drive in ten years. And finding lots of others with recruiting on their minds.

by Harrison Kinney

By year's end, IBM will have contacted 650 colleges and universities in the U. S. to interview some 35,000 students who have expressed interest in working for the corporation. With all its divisions humming, and after relatively light hiring throughout most of the 1970s, the drive is on for what, in personnel terms, are "pre-professionals"—students about to receive bachelor's or master's degrees in disciplines needed by labs, plants, and branch offices.

Competition for the best in engineering, programming, finance, marketing, and management is intense among American employers. IBM meets this competition in a straightforward manner: Rather than use recruitment specialists to interview the students, the company asks line managers from the locations and professions in which the students register interest to conduct the half-hour campus interviews.

Before start of "Career Fair" at New York University, Cary Booker, marketing manager, Office Products Division, assigned to IBM *booth, is briefed by Marilyn Kaplan, N.Y.U. placement officer, in Washington Square, lower Manhattan. Washington Arch is in background.*

Many of the 35,000 students will be extended "invites" (expense-paid trips to IBM locations) for further interviews—by managers with job opportunities. So far this year, 3,500 have accepted IBM job offers—which is approximately the company's U. S. pre-professional manpower goal for 1977.

Though 1978's hiring plans are not yet confirmed, the skills requirements are continuing, and interviewing has been taking place on campus since September, with a particular eye on those who will graduate in December and January.

Monitoring this largest hiring of pre-professionals in 10 years is E. W. Seeberger, manager of Corporate College Relations and Recruiting (formerly the National Recruiting Organization). Seeberger is a tall, bespectacled man with 25 years of personnel work in IBM. In a walnut chart case on the wall of his Armonk office, he keeps an updated history of IBM's relations with those schools assigned to CCR&R—more than 150 colleges and universities that consistently graduate people with skills of interest to IBM.

The list may change as schools initiate departments of computer science, say, or strengthen an engineering college or enhance a business-school faculty. The *number* of contacts by the corporation increases or decreases each year, too, depending on IBM's manpower requirements.

Although this roster of schools consistently provides 65 percent of the pre-professionals each year, a shortage of hard-to-find skills may alter the list slightly. For example, at present, IBM's flourishing product development activity calls for additional engineers and programmers. Seeberger and his four regional managers are, therefore, concentrating on more schools that have historically provided top-quality expertise to IBM in those fields. There is an unusual amount of competition for "double E's" (electrical engineers) these days. Consequently, Corporate recruiting has increased its list to 180 to include more "high tech" campuses.

Non-CCR&R schools have been handled by the Data Processing Division, usually working out of the branch office nearest the campus. This responsibility is now shared by other divisions, in cooperation with CCR&R. In such cases, the division representatives interview for all of IBM's pre-professional job requirements.

Seeberger's four managers, each with two or three recruiting specialists, handle their 180 schools by quadrant:

Wayne Dickert has "East," the only area—from Washington, D.C., to Maine—in which all the schools (44) can be reached easily by ground transportation from his White Plains office.

Irv Pfeiffer, Chicago, oversees "Midwest," which includes some of the country's largest state universities, with enrollments that may run as high as 100,000 students. Though "Midwest" has the fewest schools (34 at the moment), it has always turned out more IBM pre-professionals than any other region, because of those volumes. Last April, for example, 47 IBM managers were present to interview more than 500 students in one day at the University of Illinois.

Charles Cammack, "South," watches over 59 schools, out of Atlanta. Harley Thronson, "West," in Los Angeles, has more geography and flying hours than anybody. His 43 schools are scattered from Mexico to Canada, throughout the Rockies, and as far east as central Texas.

Each quadrant's schools add up to distinct characteristics: for example, "South" has most of the predominantly black colleges—29; "East" abounds in women's colleges and Ivy League schools.

Though most interviews take place during the academic year, Seeberger and his 14 people work steadily through the calendar, strengthening ties between IBM and

their colleges' student body, administration, and faculty. They arrange for IBM executives in marketing to speak at the schools of business; for engineering managers to discuss their work with colleges' engineering departments. They nurture relations between IBM scientists and their peers on university faculties. They contact professional, minority, and honor societies on campus.

"Our objective is to keep IBM's good image reinforced on campus," Seeberger says. "Many students don't completely understand what we're all about as a company; or our diversity of career opportunities. So we try to get our story told.

"We don't want any students to pass us by because they didn't realize we had exactly what they were looking for."

While IBM *managers interviewed job-seeking M.I.T. students indoors, others, including this unicyclist, enjoyed Indian summer weather. Upper right: The evening before interviews, David Horgan, recruiting specialist, second from left, meets with* IBM *managers Gerald Lehan (Burlington), left; James Sizemore (Lexington), on floor; Earl Rice (San Jose).*

Reporter's Notebook

The fall drive of IBM's Corporate College Relations and Recruiting organization got under way in early October. *Think* went along with David Horgan, CCR&R/East's contact for the Northeastern schools, from New York City through New England, for two days of his busy schedule. Our reporter's notes follow:

October 3, 9 a.m. Met Horgan at New York University's Loeb Student Center on Washington Square, Manhattan, for "Career Fair" day. Inside large room, tables everywhere. Signs tacked to them indicated two dozen employers—from oil, steel, chemicals, electronics, publishing, banking, brokerage, and accounting.

Horgan tall, blond, easy-going, quick-witted. On a rotational assignment to CCR&R from Office Products Division marketing. (Only six people permanently in Corporate recruiting. Divisions with hiring needs offer own people to complement CCR&R staff in periods of increased hiring.)

IBM's two tables manned by representatives of the three major marketing divisions—Data Processing, General Systems, Office Products. Horgan explained they were to answer questions about IBM, hand out literature, correct wrong impressions, and suggest to students they sign up for interviews N.Y.U. had scheduled for IBM later that month.

Students these days friendlier toward big business, Horgan said, than in Vietnam years. Many political movements among students; business recruiters must deal with whatever campus situation presents.

9:25 a.m. Marilyn Kaplan, assistant to N.Y.U. placement director, stopped by booth. Said seniors remember how hard jobs were to get when they entered as freshmen. From their present queries, she thought few of them seem aware things have changed. Employers may find it a seller's market this year.

9:30 a.m. Students began to wander in and pick up company literature on tables.

"I'd never understand computers," young Asian-American woman said.

"Many people in IBM wouldn't either," DPD man replied. "All that's important is to know what they'll do for people, if you're in our division."

"We're not just computers," the OPD rep told her with a smile, offering her a folder.

Spirited questions and answers. She asked for interview; was referred to N.Y.U placement office.

Horgan thought her a good prospect for IBM. A linguistics major, but with courses in "comp sci" (computer science). Relevant questions. Clear thinker. Said he hoped IBM would see her at the interviews.

IBM people spent morning answering questions. Engineering student worried he'd be swallowed up in big corporation. Thought he preferred small electronics company. Horgan told him IBM both big and small; had hundreds of small electronics groups scattered through its plants and labs, doing countless things in advanced technology. Suggested student register for interviews. Student said he would.

Much repetition in questions and answers. O.K. by Horgan who said the more they learn about IBM there, the less time spent on those matters in the half-hour interview later on.

N.Y.U. considered important school, Horgan said. Business. Management. Engineering. Name it.

Noon Career Fair lasts all day, but Horgan left to catch air shuttle to Boston.

2:20 p.m. Arrived Massachusetts Institute of Technology, Cambridge. Enrollment: about 8,500.

Conferred with Phyllis Jackson, assistant to M.I.T. placement director. Her earlier report that more than 30 M.I.T. students had requested interviews with

IBM enabled Horgan to bring on campus the next day interviewers from Endicott, San Jose, Lexington, Raleigh, and Manassas/Burlington. Interview rooms scarce at M.I.T. so Kingston, Poughkeepsie, Rochester, and East Fishkill reps scheduled to arrive the day after.

Mrs. Jackson said total interested students up to 41. Horgan delighted. Only 18 the previous fall. Big business back in fashion? Mrs. Jackson said she hoped so.

Two other employers also interviewing next day: supplier of power equipment, looking primarily for physics majors. And reps from University of Chicago's graduate school of business. ("Curses!" said Horgan, good-naturedly.) Sixty-seven percent of M.I.T. grads go on to graduate school currently. Graduate schools the biggest competitors of commercial and government employers. (IBM recruiters explain to students Tuition Refund Plan that permits employees to get advanced degrees while working for IBM). Mrs. Jackson reminded Horgan IBM was first major company on campus this fall, always an advantage.

2:40 p.m. Allen Johnson stopped by placement office. Engineering manager in Endicott. Had just met with student president of M.I.T. chapter of Institute of Electrical and Electronics Engineers. Scheduled later in fall for more "advance work" —at Tufts. Now returning to Endicott.

3:00 p.m. Had arranged for interview with placement director, Robert K. Weatherall, kindly Englishman who studied history at Cambridge University before joining M.I.T. administration.

Weatherall said bigger turnouts were in the spring. Majority of students graduate then, of course, including from Sloan School of Management, where, he said, IBM usually has good luck. Said engineering students more and more joining electronics firms in commercial area, as indicated by the 40 or so asking to see IBM.

Said M.I.T. graduates who like Boston area tend to join nearby laboratories—Lincoln and Charles Stark Draper. Local electronics companies also benefit. Major electronics competitors for M.I.T. students include predictable blue-ribbon employers. Like IBM, several hire M.I.T. students as summer employees and have co-op program—four terms working at Institute; two terms with company.

"Not to worry," Weatherall said in his British accent. "We have 300 employers visit us each year, and IBM holds its own. You already have a number of our people,* and I daresay that bodes well."

7:00 p.m. IBM managers interviewing next day met in Horgan's motel room in Peabody, north of Boston. (Quarters hard to get, it turned out, but Horgan, Boston College grad, knows his way around the area.) Interviewers sat on chairs, beds, and floor. Present:

Gerald Lehan, young, bearded M.I.T. grad; from Manassas but destined for Burlington. Seeking electrical engineers and computer scientists for the new General Technology Division at Burlington, and more double E's for the Federal Systems Division in Manassas;

Allan David, Ph.D., an American born in Canada, on a search for computer science majors for Endicott;

Earl Rice, self-confident veteran with mustache, General Products Division, interviewing chemistry and chemical engineering students who expressed preference for San Jose;

James Sizemore, lively, dapper engineer, with orders for mechanical engineers for tool designing at the OPD lab and plant in Lexington, Ky.;

Suzanne Landberg, campus representative from Raleigh, three months out of Cornell with industrial relations degree. Understudying the interview technique. (Lehan will help her handle Raleigh prospects in electrical and industrial engineering, and operations research—applied-math majors adept at model building.)

Horgan reviewed Dos and Don'ts:

- No student leaves interview confused as to outcome. Where skills and interests don't match needs, still want student to leave as friend of IBM.
- Interviewer can invite good prospect to

* More than 400 M.I.T. graduates are employed by IBM.

visit site then and there—to more than one location if asked for.

▪ Subject of salary rarely comes up. Students interested first in personal growth; individual opportunity; then location. They know IBM pays competitively.

• Avoid questions not relevant to employment. Interviewers will have students' grades and achievements, provided by M.I.T. placement office.

• A lot of good students here from other countries. O.K. to hire those with permanent resident visas. Refer others, if qualified, to IBM in students' home countries.

▪ Be prepared for extra applicants. Placement office posters and IBM ads in campus newspapers still circulating. Some students may not yet realize IBM on campus.

The two cardinal rules:

No disparagement of other employers. Get across interesting jobs and good people we have in their fields.

Second, remember, interviewing for IBM first; location second. No matter how much you like candidate, honor student's request for job and location; don't bias in favor of your installation. Questions?

"Where's a good place to eat?" Rice asked.

October 4, 8:10 a.m. Interviews always private, so talked to Earl Rice, San Jose interviewer, as he unpacked briefcase, in tiny, frosted glass-enclosed office with small table and two chairs.

Said he wasn't surprised nearly a quarter of the sign-ups designated San Jose. Some of them probably lived out that way and others liked GPD job descriptions. Rice

Want to feel wanted? Join the graduating class at Howard

Wayne Dickert, manager of Corporate College Relations and Recruiting/East, arrived at the motel in Washington, D.C., at 5 p.m. He was 260 miles from his home base in White Plains, N. Y., and his day was just beginning.

That morning, he had briefed his manager at Armonk. By noon, he was cruising down the New Jersey Turnpike, picking up traffic-flow information on his Citizens Band radio. At 4 p.m., he stopped at the University of Maryland to drop off recruitment brochures. Now, he changed into fresh clothes and rushed off to a faculty reception for corporation recruiters at Howard University.

In the busy, crowded room, Dickert caught up with the school's director of placement, Sam Hall, who told him it was "the school's biggest turnout ever for a career day." Teams from 102 companies were there to look over this year's graduating class of 1,500. Dickert scanned the room and saw representatives from the biggest names in American industry. "Tough competition," he remarked.

At 7 a.m., the following day, over breakfast, Dickert briefed the team he had assembled. They included Edward Viltz, national industry manager/insurance, Office Products Division; Charles Phelps, manager, and Donald Clark, employment representative, from IBM Central Employment in Washington, D.C.; and William Washington, a mathematician from the Federal Systems Division. Washington had brought with him Donald Francis, a 1976 graduate of Howard with a degree in electrical engineering. The Data Processing Division's branch office in Nashville had sent Andrew Terrel, also a 1976 graduate, now in training as a marketing representative.

The new employees were certain to be helpful to interested students. Both were known on campus. Terrel had been voted one of the ten best college soccer goalies in 1974, and had tried out for the U.S. Olympic Team. Their friends were sure to stop at IBM's booth.

"What we want to do is get all the sales and engineering prospects we can to sign up for interviews later this month," Dickert told his team. "This whole thing is going to come down to an awful lot of little things done very, very well, at the right time, right place. Maybe tomorrow, somebody will remember that little thing. . . ."

Little things: like following up on a phone call from an IBM engineer in Gaithersburg who suggested Dickert look up his nephew at M.I.T. (Within a week, the potential candidate was contacted.) Or like keeping in touch with the juniors who are in IBM's cooperative education program (where students work with the company as part of their normal education). "These students are almost certain to share their work experiences with their classmates," Dickert said.

By 10 a.m., students had begun to trickle into the brightly lit gymnasium. Sam Hall stopped at the booth. "We're going to have 1,000 students coming through here today," he said. "They're very much concerned with finding jobs."

The hall began to fill. The IBM booth was soon mobbed. Over and over, to more than 200 students, the IBM team members, in effect, said: "Here's what we've got to offer you. Here's how our merit system works. Here's how you can move along in a company like IBM." It seemed to work. As one young applicant put it: "As jobs go, IBM seems pretty unlimited."

By the end of the day 30 had signed up for interviews.—MARTIN J. HAMER

IBM's Ed Viltz fields questions at Howard University.

has interviewed on University of California Berkeley campus, too, and said he had lots of students there ask for positions back East for similar reasons.

Most sign-ups don't know if they want IBM or not, and vice versa. But by the end of the half hour, Rice said, both should have pretty good idea. "This interview can be a decision swinger if it's handled right," he said.

It's an information session. "The first 10 minutes," Rice said, "you learn about IBM. Next 10, I learn about you. Then

five minutes directing the session toward one action or another. No heavy technical talk, but if you don't leave understanding that we have to get advanced technology products out the back door of the San Jose plant, for a profit, I haven't done my job. If you want to join IBM to work on our smokestacks and improve our chemical emissions to protect the environment, I have to tell you we're already into that. We have outside expertise. And if that's all you're after, you're not going to be happy with us.

"IBM shares the same citizenship ideals as any of these students, and once they understand we have to stay in business by making and selling things, we usually come out O.K."

8:30 a.m. Allan David, of Endicott, was in the next small room, wearing navy-blue blazer and gray slacks. He's followed circuit package development from Menlo Park to Fishkill to Endicott to Manassas and back to Endicott.

David said Endicott needs "engine-grammers"—engineers who know programming. Some students here, he said, so big in software they can be into very deep technical area in five minutes. Fine with him.

Few rejects at M.I.T. One of the tops in engineering in the East.

8:45 a.m. Horgan welcomed first two students in easy-going fashion. Both dressed in suit, tie, and white shirt. Students seem to have notion IBM people dress that way in all parts of the business. One student cut interview short to get back to his room to change out of suit before his next class, to avoid ribbing by his peers. Another apologized for his jeans and sport shirt; said he had only one suit and that didn't get back from cleaners. One turned up wearing suit identical to Rice's.

"Nice suit," Rice told the student, who grinned.

"You should know, I'd expect to dress less conservatively if I'm hired," student said.

"I expect you would, too," Rice told him.

"Why do *you* dress like that?" student asked.

"I feel good dressed this way," Rice said.

"Why do so many in IBM dress that way?" student asked.

"I guess they feel good dressed that way, also," Rice said.

They disappeared into Rice's cubbyhole on good terms.

5 p.m. Placement office assistants have checked students in and out all day. All scheduled turned up, as well as one nonscheduled. Interviewers packed notes and student applications into briefcases. Rice left a bit early for Texas Tech. Horgan prepared to brief next group of IBM interviewers that evening for next day's schedule.

October 11 Telephoned Horgan at his White Plains office for a follow-up report.

Interviewed 42 M.I.T. students in all, he said. Thirty-nine either "invites" or referrals to other IBM locations with strong recommendations.

Said he thought they'd filled a number of the location requests: fourteen double E's; two materials science; six mechanical E's; eight comp sci and math; seven chemical E's; one metallurgist.

Won't know till December or January what acceptance rate will be, Horgan said, but anticipate five or six.

Numbers not the criterion, he added. Got high visibility on campus. Timing good. Many of the 39 will interview other employers. But IBM there first and the others will have to meet its standards. Five or six new employees a good showing. Horgan said he knows IBM a great place to work, but that it can't be right for everybody. ■

In the long run

When nearly 5,000 runners—including six IBM employees—took on the New York Marathon, the whole town came to its feet.

by Ed Grimm

They're down there somewhere. You'll have to take our word for it. Somewhere among that stream of iron filings heading along the Verrazano-Narrows Bridge toward the distant magnet of the New York Marathon's finish line are six IBM employees—there may have been more—who entered the 26.2-mile run. And completed it.

It was an outing that they and the 4,814 other starters won't soon forget. Any more than will the 800,000 who watched them at one point or another as the race wound its way through New York City's five boroughs on a brilliant autumn Sunday.

Maybe it's the course itself with its rich mix of ethnic neighborhoods, or the view from the bridge spans as the runners pound across them. Maybe it's the sheer numbers—thousands of entrants representing everyone from weekend joggers to Olympic medalists and competitors from 28 countries, and an age span of from 8 to 74. Or maybe it's the crowds—cheering, reaching out to touch, turning up stereos so that the music of *Rocky* or *Star Wars* can do its inspirational stuff, leaning in like a kind of human tunnel. Whatever the reason, in its second year, the New York Marathon has become an indelible experience for anyone, spectator or participant, who is part of it.

"The whole thing kind of assaults the senses," says Bill Blair, a senior attorney with the Data Processing Division. Blair has been running for seven years and trained rigorously for the big race for two months, running up and down hills so that inclines like the Queensboro Bridge wouldn't faze him. He set a pace that would guarantee his finishing, and what he will remember most were the people reaching out along the way to pat or touch him. "I'll never forget this woman in the South Bronx," he says. "She looked at me—and by that time I was showing the strain, I guess—and she said, 'Smile, brother, smile.' "

"C'mon, feet, move!" Those were the words that Earl Wunderli remembers hearing. They were spoken by a fellow runner who had stopped in Central Park to massage a cramp out of his legs. Wunderli took the cue himself and shook off the fatigue that had crept up on him in the last four miles of the race. "I never had any problem with wind," he said, "but my legs got mighty heavy in the homestretch." Wunderli has been running seriously (there doesn't seem any other way to run these days) for about three years now. He is a senior counsel at Corporate Headquarters, and did some of his training in the Armonk recreational area.

The race left him so keyed up that, driving home afterwards to Stamford, Conn., he missed his highway turnoff.

What struck John Iverson most about the New York race was its incredible contrast to the marathon he ran last May 200 miles north of San Francisco. That one was called the Avenue of the Giants and it took 1,200 runners through groves of redwood trees, in deep forest shade all the way. "There were just a few people along the road," Iverson remembers, "and dead silence except for the padding of feet. The combination of that and the New York race constitutes one of the greatest experiences of my life."

Iverson, a business and planning manager with the System Products Division, ran with a stopwatch. He finished to the minute of the time he'd planned.

Don Holmes had precise goals, too. They included "being able to get to work the next morning." He accomplished them all, bettering last year's time by 18 minutes. "I figure I've run 1,900 miles over the last three years training for this one," he says. Holmes, a program manager for information systems with SPD, suffered a thigh cramp a scant quarter-mile from the finish. "It was like an iron bar," he says, "but I'd have gone in there on my knees if I had to."

Jan Palmer, a staff analyst with Corporate information systems, had run his first marathon in Yonkers, N. Y., in May. He tired at the 18-mile mark, which is precisely the make-or-break point that marathoners call The Wall. "But it never occurred to me not to finish," he says, "and those last three miles in the park, with wall-to-wall people cheering you on, gave us all that final boost we needed."

About 45 seconds ahead of Palmer at the finish was Bob Kaplan, a senior market analyst with Corporate Headquarters. It was the fifth straight year in which he'd finished a marathon in under three hours. He also qualified for his fifth Boston Marathon, along with first-timers Palmer, Iverson, and Wunderli. "I'm beyond trying to be in the top ten," he says, "but the experience—the helicopters overhead, the Manhattan skyline, the people cheering you along—it was really spectacular." Like the others, Kaplan was also taken by the capes that were thrown over the runners' shoulders at the finish line that 3,800 of them crossed. They were gold foil and designed to keep away any sudden chilling.

"We looked like gladiators in those things," says Don Holmes. Not entirely inappropriate. ■

Best of the bunch

(Continued from page 28)

quite a fleet."

To keep American's entire fleet in prime flying condition—and safe—is a feat in itself. In the old days, they would take every airplane apart every so many thousands of hours. Today, with a grand total of 234 airplanes—Boeing 727s, 707s, and 747s, and McDonnell Douglas DC-10s, it would be prohibitively expensive. And the equipment would have to be flown into the company's maintenance base in Tulsa, a vast sprawl of five mammoth hangars and assorted buildings covering more than 1.7 million square feet of floor space.

To be sure, airplanes are flown to Tulsa from time to time for a complete overhaul, but now it's more a matter of parts and stress than elapsed time. As Cecil Rivera, head of the maintenance shop at Tulsa, explains it: "Using computers, we can keep track of the particular kinds of stress that occur on particular parts of the airplane. The elapsed time is not nearly as important to an engine, for example, as what we call cycles. In the takeoff and landing cycle, you put a lot of stress and strain on an engine, but you can cruise along for hours without all that wear and tear."

As for other parts of a plane, let's assume that the X landing device on such-and-such a plane will need servicing some time within so many weeks. That information can be stored in a computerized cycle of planned maintenance. So the health record of every plane and its millions of parts is monitored and updated continually. Before every shift, the shop foreman gets a printout telling him what he ought to be doing on a particular plane or piece of equipment, and how many people he'll need to do what. "So," says Rivera, "in terms of tracking the day-to-day work of that shop, we're right on target."

If maintenance is absolutely essential to air safety, so is a qualified crew. They get their basic training—and refresher sessions—at the American Airlines Flight Academy (a short drive from the Dallas/Fort Worth airport), a cluster of gleaming white buildings, grassy courtyards, and splashing fountains.

Pilots and flight engineers get much of their cockpit training without ever leaving the ground—in flight simulators complete with instrument panels and all the bells and whistles. (Most new pilots come to American with at least 2,000 hours of flight time.) Perched on hydraulic stilts, the simulator can rotate, pitch, go straight up and down, and simulate daylight, dusk, or darkness in takeoff and landing with its TV projection system.

When the hatch closes and the simulator begins to "fly," the sensation is so uncannily close to the real thing that some trainees may forget, at times, that they're not airborne. As J. L. Mansfield, manager/instructor of training and techniques at the Academy, says: "You can do practically everything in a simulator that you can in a real airplane." (He knows whereof he speaks, coming from an Air Force career that took him to Europe, Korea, and Vietnam, before he landed at the Pentagon.) The simulator is also safe: Crews can practice hazardous maneuvers without risk. It is far less costly than taking a bona fide airplane out of service for training. And it saves that critical commodity: fuel.

The IBM account team supporting American Airlines in New York City consists of Lawrence J. Cooper, account executive, and Herbert Hartmann, senior marketing representative. In Tulsa, Okla., site of the airline's computer center, it's J. Donald Jones, IBM systems engineer manager, and his 12-member crew of sales, systems engineering, and administrative personnel.

Predictably, the whole marketing team spends a good deal of its time airborne, flying around to American installations and IBM locations (for management briefings) throughout the country—particularly Tulsa and Dallas/Fort Worth.

Cooper, who has been on the American Airlines account for the past two years, says: "It's unique in that there is a total correlation role Herb and I are able to play for all IBM divisions. That's because American uses so many kinds of our equipment, ranging from the smallest machines up to the big 3033, which is on order." Their office is just a block away from the airline's New York City headquarters at East 41st Street and Third Avenue. The proximity is a great help, since Cooper and Hartmann work closely with Jim O'Neill, American's vice president of data processing and communications services. "He calls us his ombudsmen," says Cooper, "because one or the other of us is always available to look into any problems that arise."

In the nearby Learning Center at Dallas/Fort Worth, flight attendants and ground personnel get their basic training, which ranges from computer-assisted (they call it "SABRE-assisted") classroom instruction to hands-on training in mock-ups of all the equipment they'll be flying. In emergencies, for instance, they learn how to clear a fully occupied 747 in 90 seconds or less.

A pilot—like those of any airline—can fly only a limited number of hours. At American, the maximum is 75 hours a month. He can't fly more than 8 hours in a 24-hour day. He can't be on duty more than 14 hours a day. He has to have at least 10 duty-free periods a month. These are standards set by the Federal Aviation Administration and American Airlines in contractual labor agreements with its pilots, all in the interest of air safety.

As John Norton, director of flight systems at American's New York headquarters, says: "All these factors make the crew a difficult-to-manage resource, since we have 3,500 pilots, 500 flight engineers, and 1,000 flights a day. But we have a new SABRE application, a crew-tracking system, that helps.

"For example, a pilot bids on what he wants to do by seniority. If he has that seniority, he has preference, even if he wants to fly round trips between New York and L.A. all the time. So we're required to post lines of flying."

All this information goes into a data base, and into a real-time system. As flying lines are awarded according to seniority, entries are made on a remote terminal, and the pilot is matched up with a scheduled line of flying for the month. The system can also project how much pay time has been generated in a given month (a senior pilot with American can earn as much as $100,000 a year). But there's always some unforeseen extra flying. So if, for example, a pilot runs over his allotted time before month's end, he's not "legal" by FAA and contractual regulations, and the computer system will alert the crew scheduler to find somebody else.

American is now working on computer scheduling for its 4,800 flight attendants —who are no longer called stewards or stewardesses. Three flight officers now flying American Airlines are women—which led to a clear case of role reversal aboard a flight not long ago. The flight engineer had gone aft to check the hatches after takeoff—a routine safety precaution. As *she* was returning to the cockpit, a young mother held out a baby's bottle and asked her to warm it up, whereupon the flight engineer turned to summon the flight attendant:

"Harry! Over here, please." ■

Competition? Plenty of it but it doesn't seem to faze IBM Japan

If the United States has the largest economy in the world, with the Soviet Union second, who has the third largest?

Answer: Japan, with a compound growth rate of 8 percent over the last decade. IBM Japan contributes to that national vitality, last year leading all IBM World Trade countries in installations. This year, revenue gains of IBM Japan are 12 percent over last year's, and by year's-end the bustling subsidiary is expected to turn in its best performance record ever.

Small wonder, then, that Japan was chosen as the site of an October combined meeting of the IBM and IBM World Trade Americas/Far East Boards. Or that the two-day information exchange was a highly positive one.

It had been 12 years since the last combined Board meeting in Japan. In that time, under the leadership of Sanae Inagaki, IBM Japan chairman and chief executive officer, the Japanese company has increased its taxable income to become, on that basis, the 11th-largest corporation in that country.

IBM Japan, 3,500 strong in 1965, today has over 11,000 employees in development, marketing, service, and manufacturing. Development activities center on communications products. And IBM Japan's plants at Fujisawa and Yasu manufacture System/370 processors, terminals, and peripheral products.

IBM Board members, who occasionally meet abroad to learn at first-hand the company's operations outside the U.S., spent a busy two days visiting the facilities of IBM Japan and hearing commentary on the company by its management and A/FE executives. They were also addressed by U.S. Ambassador Mike Mansfield; Chie Nakane, noted educator; and Kiichi Miyazawa, a member of Japan's House of Representatives.

At a luncheon meeting of distinguished Japanese leaders in business and government, IBM Chairman Frank T. Cary lauded the role of the Japanese company in Japan's economy. He pointed out that purchases from Japanese suppliers by IBM Japan last year alone came to more than $90-million, and that the company exported goods worth over $131-million.

Cary was especially appreciative, he said, of the partnerships IBM Japan has built with its customers in banking, steel, broadcasting, publishing, and with many other commercial users of data processing.

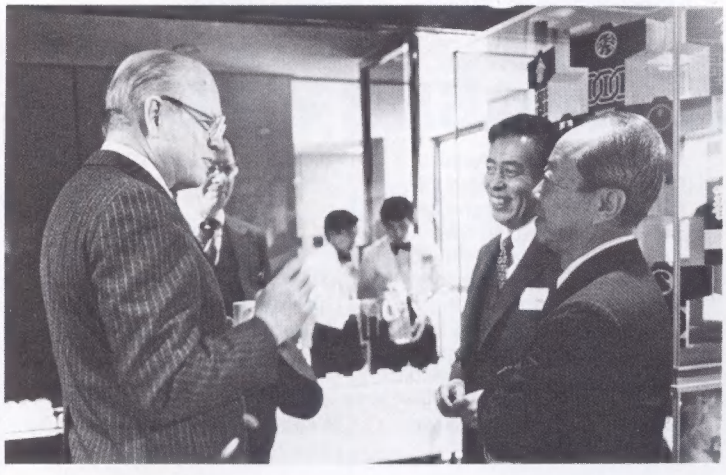
IBM Japan's achievements are in the face of lively and rapidly increasing competition. Already one of the most competitive computer marketplaces in the world, Japan is only now on the edge of what some foresee as a worldwide push in Japanese-made computers to rival that country's earlier successes in steel, autos, and consumer electronics.

Indeed, Cary acknowledged, in response to a security analyst's question in Chicago in November, that "Japanese firms have good technology, they're competently managed, and they're very, very tough competitors."

Yet, as Ralph A. Pfeiffer, Jr., IBM senior vice president and A/FE chairman, told the IBM and A/FE Boards, he expects IBM Japan to continue its outstanding performance as "one of the most dynamic companies in IBM today."

That confidence may be indicated by a recent survey of Japanese university science and engineering seniors who were asked what companies they would like to work for. Despite strong, traditional feelings of nationalism, IBM Japan took sixth place, and was the only foreign-based firm in the top 30 companies named. ■

—HARRISON KINNEY



Left: IBM *Chairman Frank T. Cary and* IBM *President John R. Opel at a coffee break with, from right, Kiichi Miyazawa, a Japanese official and guest speaker, and* IBM *Japan President Takeo Shiina. Right:* A/FE *Chairman Ralph A. Pfeiffer, Jr., with Nobuo Mii, director of the* IBM *Japan Fujisawa development laboratory.*

to think

Courageous ones

The article on handicapped employees in the July/August issue was heartwarming. These people are courageous, and I am glad to be part of a company that cares about them.

The articles on fellow employees always interest me most, but this one more than others.

Rosalie R. Barber
East Fishkill, N.Y.

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The editors of *Think* Magazine will print as many letters dealing with the publication's content as possible, but reserve the right to edit all letters for reasons of space or clarity. No unsigned letters will be considered for publication.

Thanks. Let's have more

[Our Chairman] recently received a brochure entitled *Thoughts on the American Business System,* which contained a series of articles that had appeared in your *Think* magazine. We have found these articles to be very interesting and thought-provoking, and would like to obtain additional copies for distribution among our executives at McCrory here and in New York.

(Mrs.) Doris Douglas
Administrative Assistant
to the Chairman
York, Pa.

Passing it along

I recently read a copy of your booklet *Thoughts on the American Business System.* The copy belonged to a friend. I would appreciate it if you would mail a copy to me as I would like to pass it along to my children. They are not as confident as I am that the American Business System works well. Perhaps they will understand the system better —as I did—after reading the excellent collection of articles you have assembled.

Thomas M. Skove
Aurora, Ohio

Teachers' aid

Your publication, *Thoughts on the American Business System* is fantastic. I know your interest basically was to increase the economic literacy of your own employees. However, we have been using this publication in working with our Secondary teachers. It is an excellent resource.

Judith R. Bristol
Economics Consultant
Houston Independent School District
Houston, Texas

(Editor's note: The collection of articles from Think *is now in its second printing. Copies are available through the IBM Mechanicsburg Distribution Center, East Simpson Ferry Road, Mechanicsburg, Pa., 17055. Order No. G505-0033.)*

Our heritage

My husband is an IBM employee, originally from Owego, N.Y. We were born and brought up in the Triple Cities area of New York, and are well acquainted with the heritage of IBM.

My interest was aroused over the letters on the [July/August issue] regarding "The buildings of IBM."

We have been very fortunate to see IBM buildings in Sweden, Scotland, England, various parts of Europe, and now Brazil. Seeing them has always made me proud to be a member of the IBM family.

Our compliments to you and your staff on the "readability" of *Think.*

E. J. Rossi
São Paulo, Brazil

Three for the money

Think, July/August '77: "Big Stakes" is a very timely article, regarding the convergences between information processing and communications, and well done.

"Already an anachronism"—the update on the Justice Department's antitrust trial was especially interesting to me as a former member of IBM's litigation team, prior to the trial start.

Your two-page photo of GSDHQ was especially good—most pleasing to the eye of this photo-journalist.

Edward F. Palmer
Westlake Village, Calif.

Friendly persuader

You cannot imagine how many new friends I got due to the amazing penetration of the *Think* magazine [July/August, "They teach the teachers"].

Alvaro G. Salla
Poughkeepsie, N.Y.

Quality-conscious

A letter in the [July/August] *Think* Magazine prompts this. The writer states that she had noticed a creative improvement in the magazine. For some time I have been impressed with the improved quality of the magazine and wanted to share my thoughts with those at *Think.* Its arrival is always anticipated and the magazine is always enjoyed in my home. Thanks for a good job.

Ken Johnson
Armonk, N.Y.

Tip of the hat

Your July/August issue of *Think* with the article, "Handicapped? Not on the job," was very interesting. I would like to express my congratulations to those people for their outstanding work for IBM.

Richard A. Etkie
Boca Raton, Fla.

Uplifted

My husband is employed by IBM. It is uplifting to read an article such as "Handicapped? Not on the job" (July/August).

Often I have taken trips vicariously where IBM stories have focused. The photography, layout, and quality of paper add that final "nice-ness." I like IBM, and *Think* has added to that opinion.

Mrs. Stephen Antonacci
Arlington, Va.

Cassette, anyone?

The article about the handicapped IBMers in your [July/August] issue was fascinating. I am a blind programmer working at Santa Teresa Laboratory and since joining IBM in January of this year, have discovered that IBM is willing to give ANY qualified individuals a chance to be productive, regardless of any physical disabilities. Your article reaffirms my impressions.

Have you ever considered putting your magazine in Braille or on cassettes, so that those of us unable to easily read conventional print could read it?

Mary Emerson
San Jose, Calif.

(Editor's note: Think *cassettes are available for each issue. They are produced for IBM by the American Foundation for the Blind, Inc. Contact your manager for further information.)*

Strong on solar

I really appreciated your article on solar homes, by Ruth Baker, in the September/October issue. I was particularly interested in the plans of the Bob and Michele Gooby family in Pound Ridge. I find the concept of their house fascinating.

Phil Kregor
Eureka, Ill.

In Fuji's shadow, a meeting of minds

With Mount Fuji rising sublimely within view of its windows, IBM Japan's Amagi Homestead is set in the mountains of the Izu Peninsula, 130 kilometres south of Tokyo. Most of the time, it's a place where customer executives learn about data processing techniques and applications. But Amagi plays another role for two days every year. At the invitation of the steering committee for the Amagi Conference, which includes IBM Japan's President Takeo Shiina, a group of Japan's loftiest thinkers—from every discipline—comes to Amagi to contemplate and explore matters of importance to the country at large.

Among this year's guests from outside Japan were Edwin O. Reischauer, former U.S. Ambassador to Japan and now a professor at Harvard University, and Harrison E. Salisbury, Pulitzer Prize-winning journalist, now retired from *The New York Times*. The theme was "Toward the Future—Japan and the World Environment," and topics ranged from the world monetary system and the oil crunch, to trade practices and cultural barriers.

There was no pressure to come to conclusions or agreements at the Amagi meetings—there never is. The atmosphere is purely exploratory. But Yasuo Takeyama, managing director of the *Nihon Keizai* newspaper, put the matter at hand as succintly as anyone: "Japan and the world will have to learn the technique of crisis management in the future, as contrasted to that of *trend management* in the past."

in think

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Dishes are coming on the rooftops. And with them, a new way to send data faster, farther, and cheaper. Page 13

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